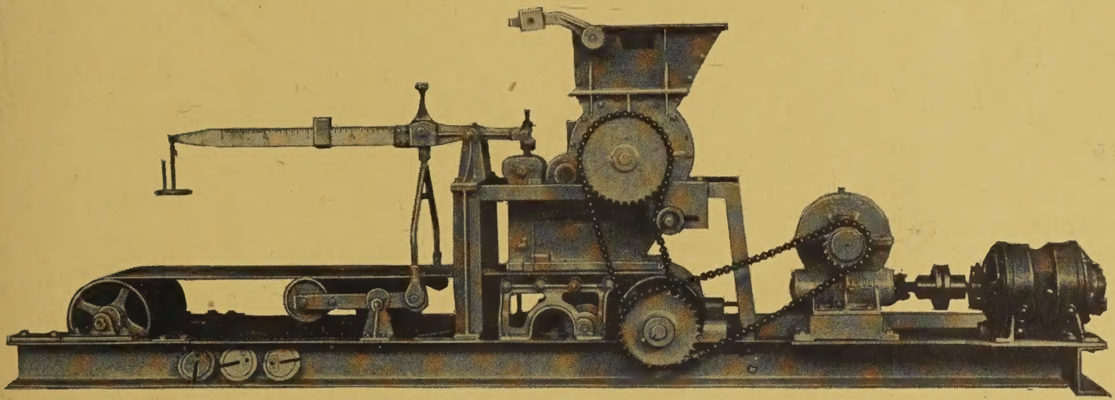
MILL SECTION of
Concrete

Modern Cement

makes accurate proportioning a necessity

Schaffer Poidometers

make such proportioning a practical possibility



The Automatic Feeder, Weigher and Conveyor

Over 200 Poidometers are today in operation in cement mills furnishing automatic control at those points where accurate proportioning of materials is essential.

But the Poidometer is not only accurate—it is economical as well. It saves labor wherever installed.

Have you a proportioning problem which you would like to handle more accurately or at less cost? Then it will pay you to investigate the Poidometer.

Let us send you our catalog number 75. It will furnish you the details of how the Poidometer increases the accuracy of proportioning materials at the same time that it reduces the cost.

SCHAFFER POIDOMETER COMPANY
2818 Smallman St., Pittsburgh, Pa.

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POLYSIUS EQUIPMENT
IN USE IN
CEMENT PLANTS
THROUGHOUT THE WORLD

The supremacy and recognized leadership of Polysius Equipment is reflected in the installations in these plants scattered over the four corners of the globe.

The well known firms of Cramp Morris Industrials, Inc., Philadelphia and the Coatesville Boiler Works, Coatesville, Pa., collaborate in the building of Polysius Equipment.

Polysius Equipment in the New Plant of The Keystone Portland Cement Co., Bath, Penna. . . . .

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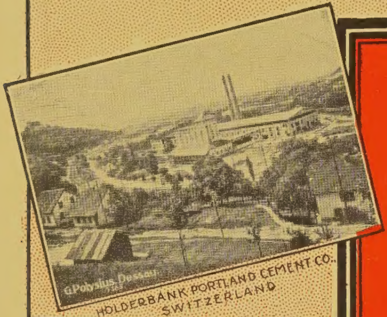

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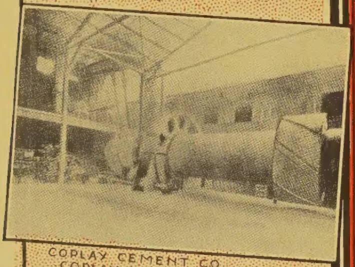
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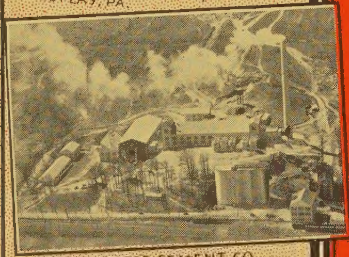
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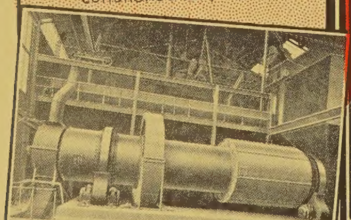
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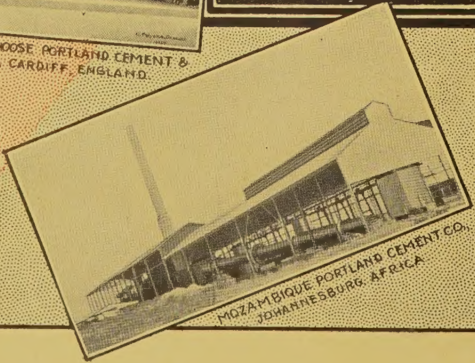
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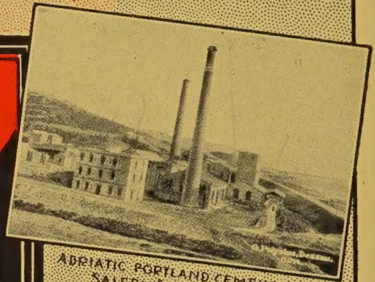
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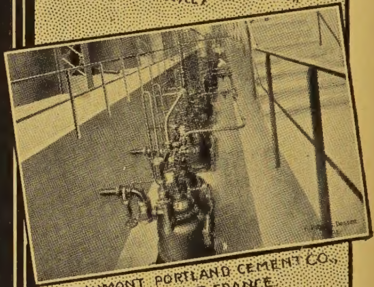
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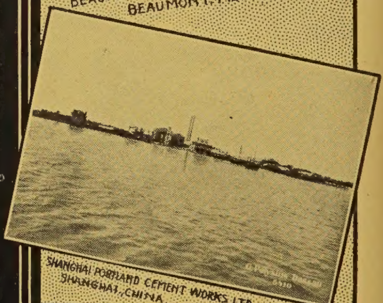
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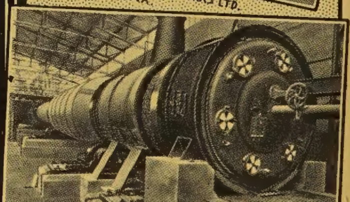
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MILL SECTION of
Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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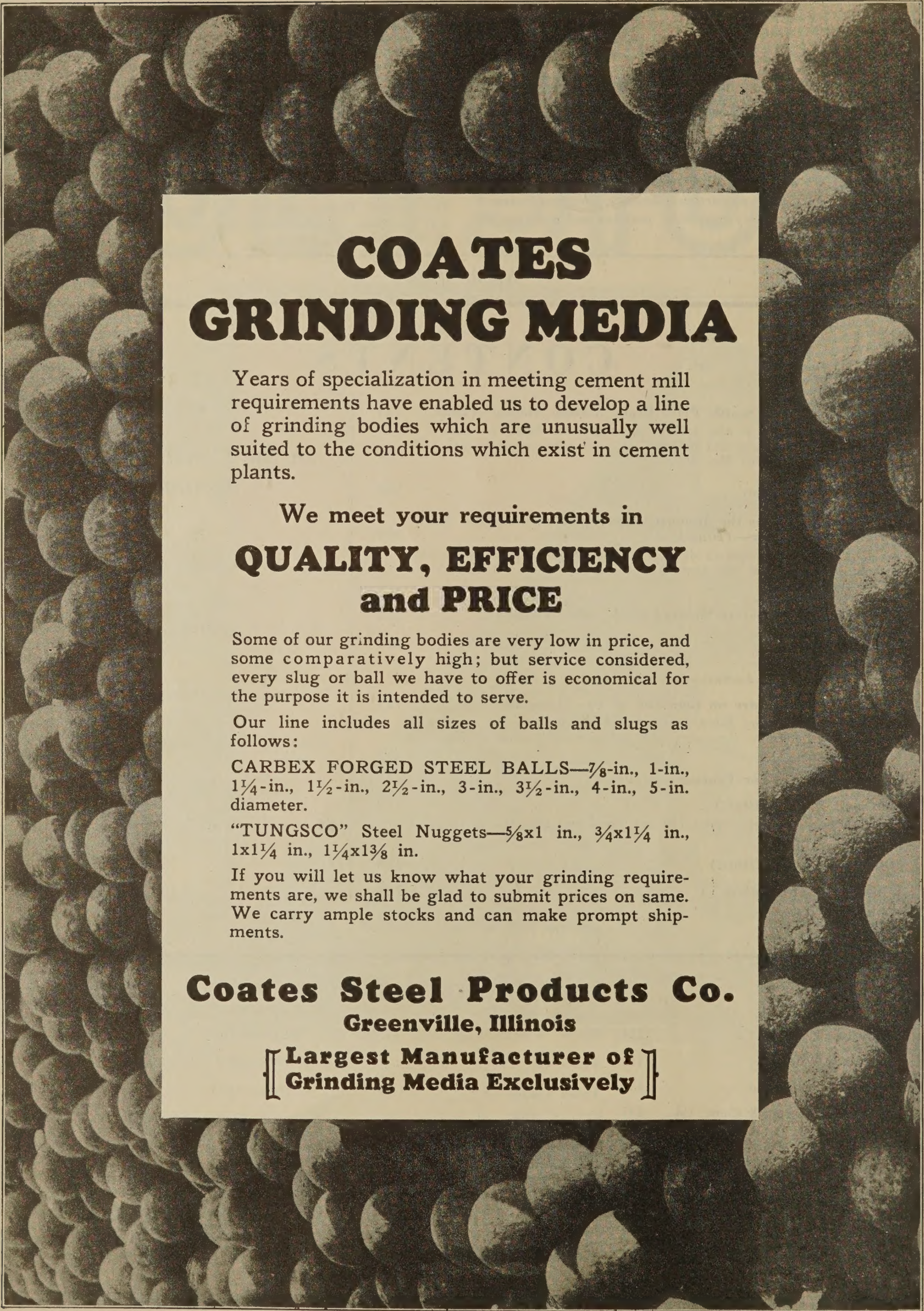

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Years of specialization in meeting cement mill requirements have enabled us to develop a line of grinding bodies which are unusually well suited to the conditions which exist in cement plants.

We meet your requirements in

QUALITY, EFFICIENCY and PRICE

Some of our grinding bodies are very low in price, and some comparatively high; but service considered, every slug or ball we have to offer is economical for the purpose it is intended to serve.

Our line includes all sizes of balls and slugs as follows:

CARBEX FORGED STEEL BALLS—⅞-in., 1-in., 1¼-in., 1½-in., 2½-in., 3-in., 3½-in., 4-in., 5-in. diameter.

"TUNGSCO" Steel Nuggets—⅝x1 in., ¾x1¼ in., 1x1¼ in., 1¼x1⅜ in.

If you will let us know what your grinding requirements are, we shall be glad to submit prices on same. We carry ample stocks and can make prompt shipments.

Coates Steel Products Co.
Greenville, Illinois

Largest Manufacturer of
Grinding Media Exclusively

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MILL SECTION of

Concrete

Vol. 34 Chicago, April, 1929 No. 4

Limestone for New Seattle Plant Brought from Alaska

Project Based on Exhaustive Surveys of Economic Conditions—Design of New Plant Based on Studies of Cement Technology, Modern Machinery and Methods—Raw Material Handling Influences Plant Layout—Rock Delivered from Alaska in Steel Cargo Ships—Hammerhead Crane Handles Rock at Plant Wharf—Clay Department—Plant Equipment—Cottrell Plant—Laboratory—The Alaska Quarry—The Development of the Project—Plant Designed to Make Normal and Special Cements

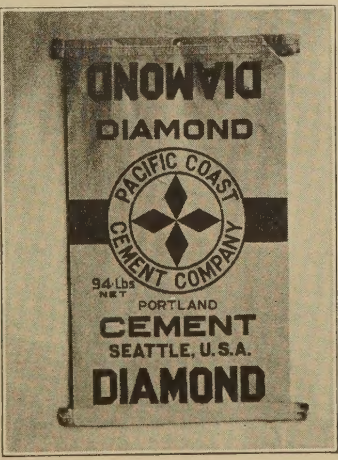
By S. E. HUTTON
Research Engineer, Pacific Coast Co., Seattle
Photographs by Boris Kviatkovski, Draftsman, Pacific Coast Engineering Co.

THE plant of the new Pacific Coast Cement Company (a subsidiary of the Pacific Coast Company) is located on tidewater, about four miles from the business center of Seattle. It occupies a considerable part of a nineteen-acre tract, approximately six hundred feet wide, along East Waterway on the west and along East Marginal Way on the east, and about fifteen hundred feet long.

The layout of the plant was determined by the shape of the tract, by the shipping connections to be made, and by a desire to have a compact and economical arrangement that yet would not prevent expansion by the addition of any type and size of equipment that future conditions might justify.

The plant was designed to produce—under close control and at low cost—normal portland cement, high early strength cement, or any special cement for which sufficient demand might be developed.

The complete layout includes four kilns, 11 ft. 3 in. by 240 ft., three raw mills, and three finishing mills, 7 ft. by 45 ft., and silos of 200,000 barrels capacity. The present installation includes two kilns, three mills, nine silos of 90,000 barrels capacity, rock storage capacity of 100,000 tons, clinker storage capacity of 150,000 barrels, and clay mill and slurry tanks sufficiently large for the fully developed plant.

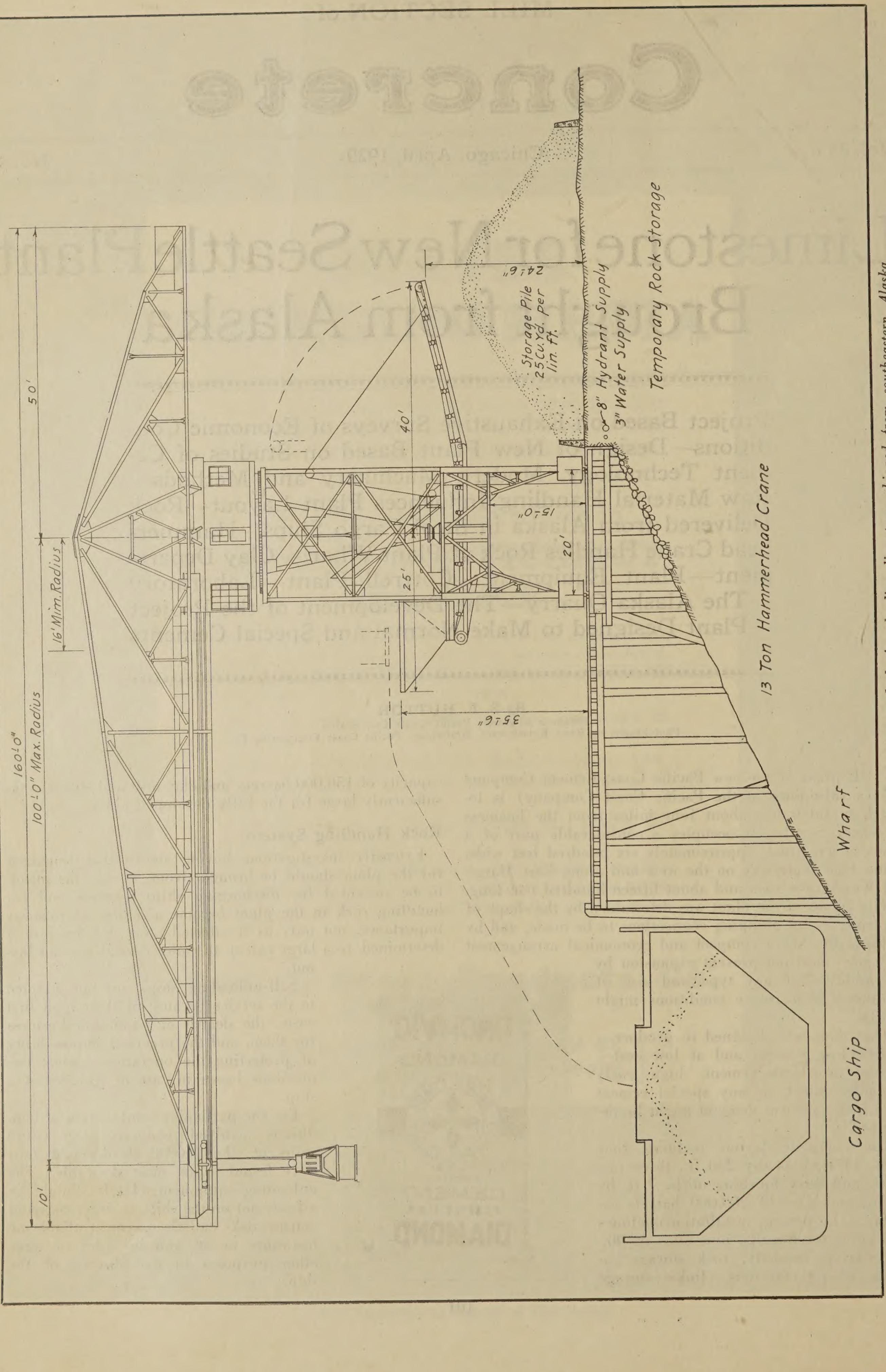


Rock Handling System

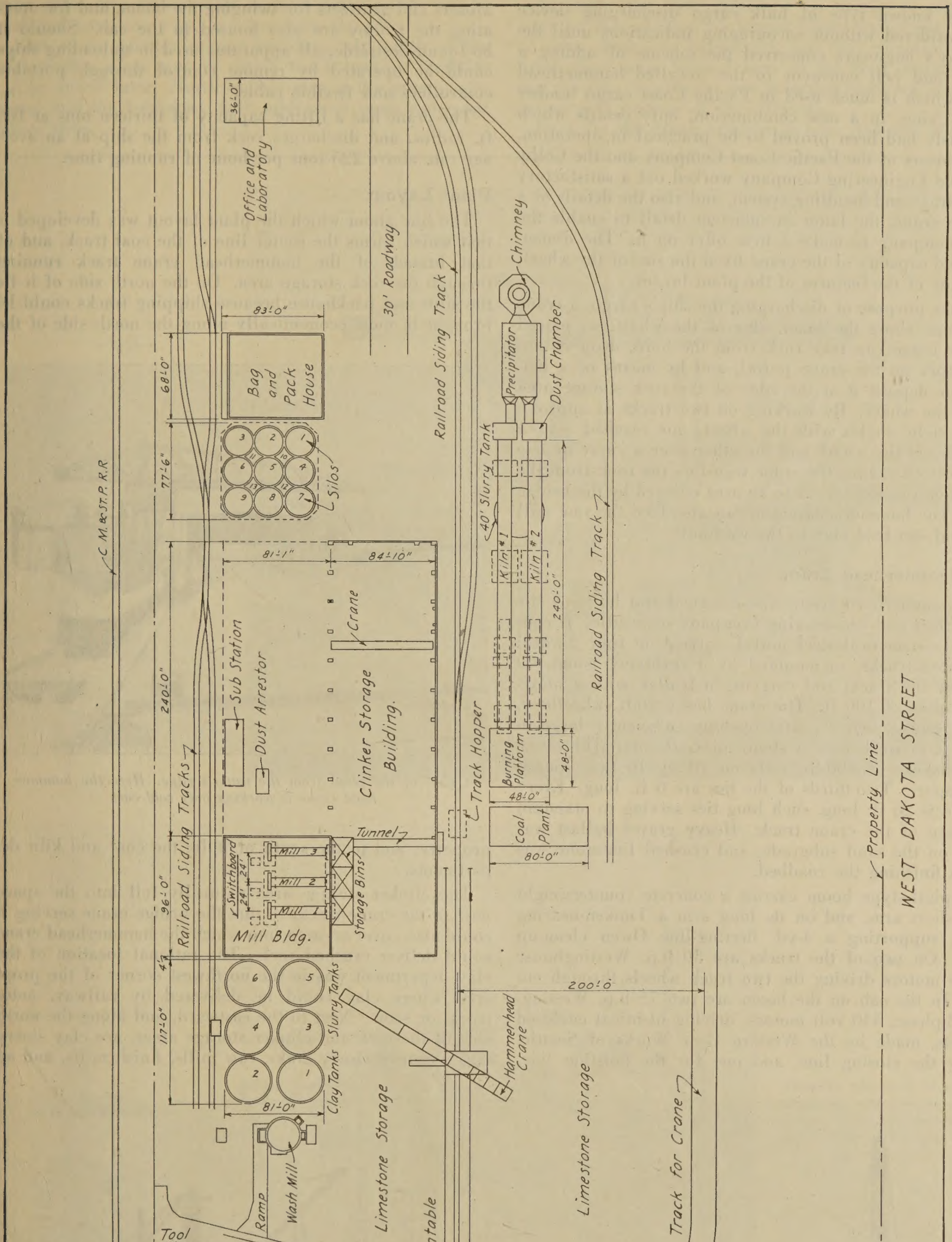
Extensive investigations having shown that limestone for the plant should be brought from Alaska, the means to be provided for discharging ships' cargoes and for handling rock in the plant became a matter of primary importance, not only as it affected costs, but because it determined, to a large extent, the most desirable plant layout.

Self-unloading ships are not adapted to the service because of their high first costs, the dearth of profitable business for them, and the practical impossibility of protecting the operation against tremendous losses in case of the loss of a ship.

For the particular combination of conditions involved, ordinary steel cargo ships of about 6000 dead-weight tons were found to be most desirable. The unloading equipment, clearly, should be ashore, not on the ship, in order to avoid marine risks and the payment of marine insurance on it, and in order to serve other purposes in the absence of the ship.



The hammerhead crane at the wharf, showing method of unloading limestone shipped from southeastern Alaska



Layout of the new plant of the Pacific Coast Cement Co. at Seattle

Every known type of bulk cargo discharging device was considered without encouraging indications until the company's engineers conceived the scheme of adding a hopper and belt conveyor to the so-called hammerhead crane, which is much used in Pacific Coast cargo lumber mills. Using, in a new combination, only details which previously had been proved to be practical in operation, the engineers of the Pacific Coast Company and the Colby Steel and Engineering Company worked out a satisfactory rock storage and handling system, and also the details of a suitable crane, the latter in sufficient detail to enable the Colby company to make a firm offer on it. The dimensions and capacity of the crane fixed the size of the wharf, and many of the features of the plant layout.

For the purpose of discharging the ship's cargo, a crane track runs along the inner edge of the wharf, so placed that the crane can take rock from the hold, drop it into the hopper on the crane portal, and by means of a belt conveyor deposit it at the edge of the rock storage area behind the wharf. By working on two tracks at approximately right angles with the wharf, one reached over a turntable on the wharf and the other over a curve of one hundred foot radius, the crane transfers the rock from the cargo dump to storage, or to an area covered by the bridge crane. The hammerhead crane can also feed the raw mill bins, and can feed clay to the washmill.

The Hammerhead Crane

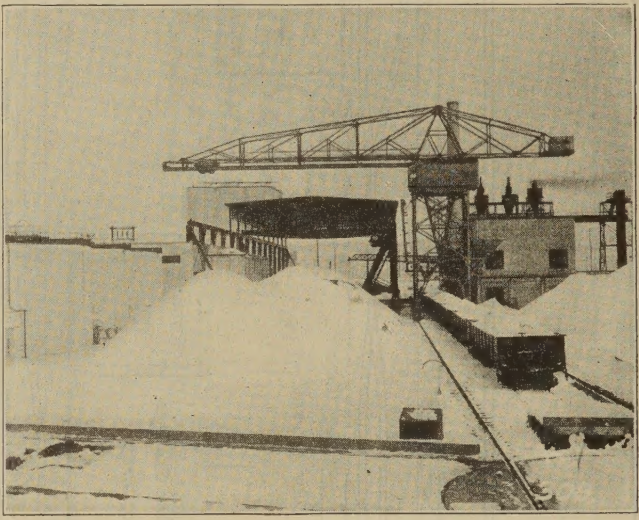
The hammerhead crane was designed and built by the Colby Steel and Engineering Company of Seattle. It consists of a structural steel portal, carried on four 2-wheel articulated trucks, surmounted by a revolving boom, 60 ft. above the track, and carrying a trolley with a maximum radius of 100 ft. The crane has a 20-ft. wheelbase, a 20-ft. gauge, and a portal opening sufficiently large to enable it to work over a string of coal cars. The crane track consists of 100-lb. rails on 10 by 10 ties, spaced 10 in. apart. Two-thirds of the ties are 6 ft. long. Every third tie is 26 ft. long, such long ties serving to maintain the gauge of the crane track. Heavy gravel ballast was placed on the sand subgrade, and crushed limestone was used in finishing the roadbed.

The pintle-type boom carries a concrete counterweight on its short arm, and on its long arm a Timken-bearing trolley, supporting a 4-yd. fleeting-line Owen clean-up bucket. On two of the trucks are 30 h.p. Westinghouse 3-phase motors driving the two truck wheels through cut gears. In the cab on the boom are two 75 h.p. Westinghouse 3-phase, 440 volt motors, driving identical enclosed gear sets, made by the Western Gear Works of Seattle, one for the closing line, and one for the hoisting line. Motors and gear sets for swinging the boom, and for operating the trolley are also housed in the cab. Should it be found desirable, all apparatus used in unloading ships could be operated by remote control through portable controllers and flexible cable.

The crane has a lifting capacity of thirteen tons at 100 ft. radius, and discharges rock from the ship at an average rate above 225 tons per hour of running time.

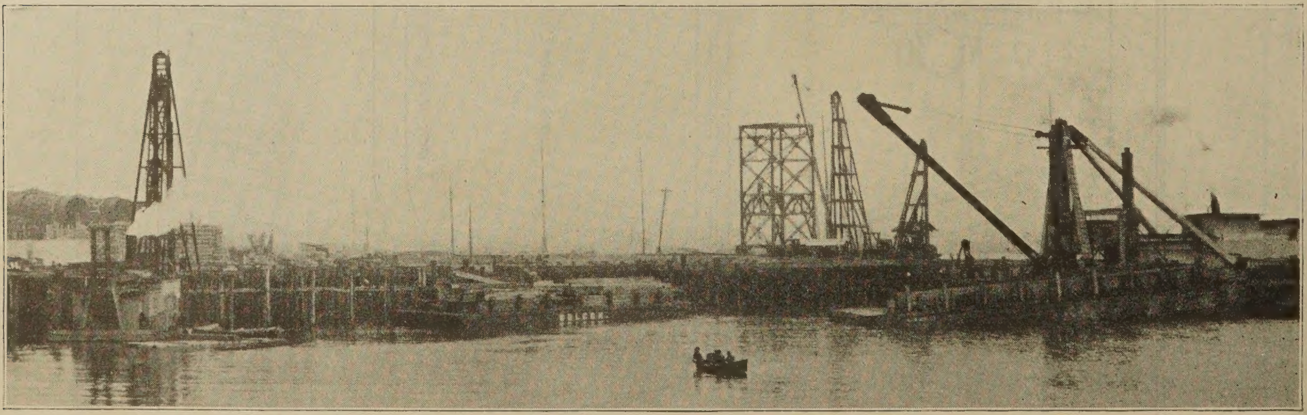
Plant Layout

The line about which the plant layout was developed is that which forms the center line of the coal track, and of that branch of the hammerhead crane track running through the rock storage area. On the north side of it lie the silos and packhouse because shipping tracks could be brought in most economically along the north side of the property, and to the south of it lie the coal and kiln departments.



A view of the plant from the water's edge. Here the hammerhead crane is working over coal cars

The clinker storage area naturally fell into the space next to the crane track, so that the bridge crane serving it could also cover an area into which the hammerhead crane could deliver crushed rock. The rational location of the clay department was in the northwest corner of the property, where clay could be delivered by railway, autotruck, or scow. Next to the eastward, and along the north side of the rock and clinker storage areas, are clay slurry tanks, cement slurry tanks, raw mills, finish mills, and an



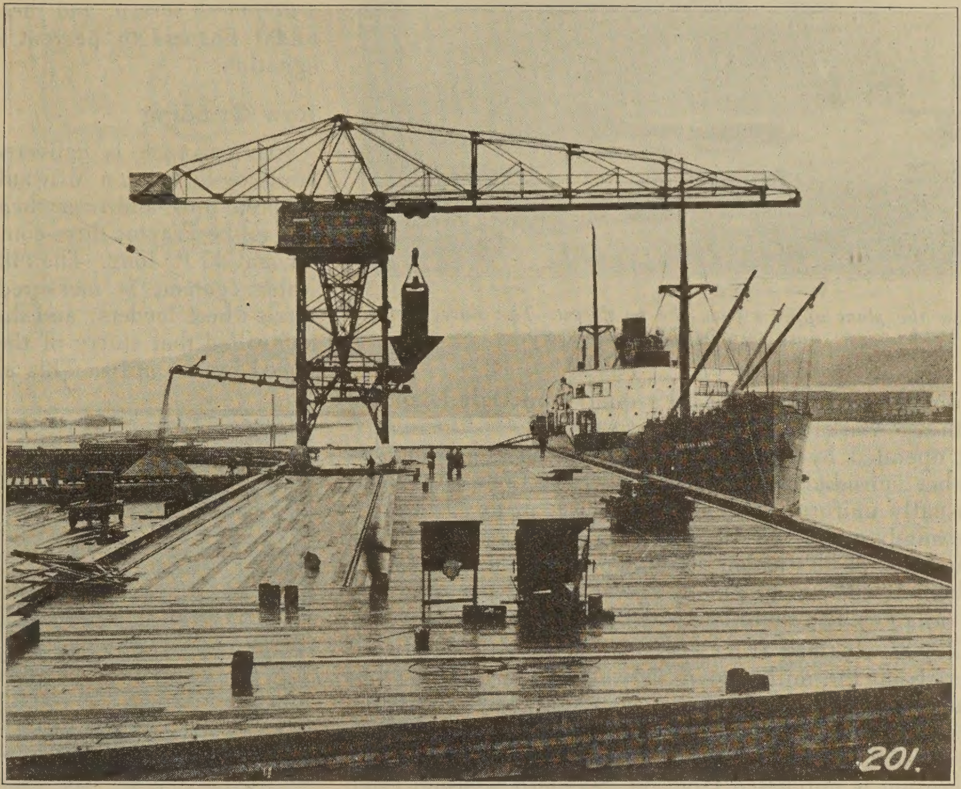
A view of the construction of the wharf, erection of the hammerhead crane, sounding of E. Waterway, and the dredging of the channel open space into which mills or related equipment can be extended from the west, or silos from the east.

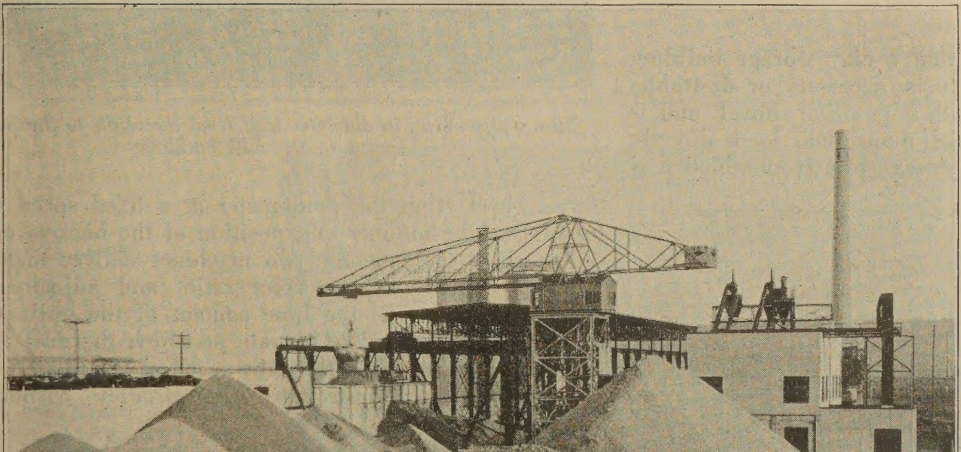
East of the clinker storage building, and north of the coal tracks, is an area in which truck loading facilities can be added later. North of this area is the present silo group and the baghouse, with additional open space for future silos.

In order that there might be no barrier to expansion later by the addition of longer kilns, waste-heat boilers, or other desirable equipment, the coal department and firing floor were located next to the rock storage area, and the kiln department was extended eastward toward an unoccupied portion of the property.

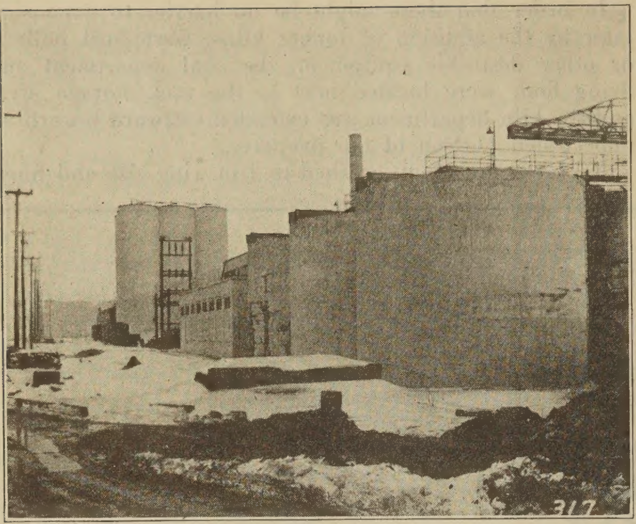
Rock for the plant, crushed to 1-in. ring size and finer,

On October 30*th*, 1928, *the first cargo of Alaskan limestone was discharged, as shown*





Showing the rock storage areas as seen from the water. Here the hammerhead crane is loading the raw mill bins



How the plant appears from the northwest. The slurry tanks are seen in the foreground

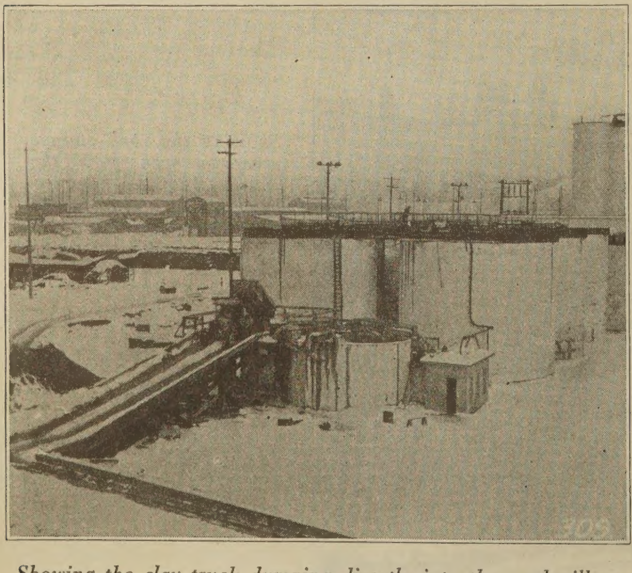
is brought from the company's quarry on Dall Island in southeast Alaska in 6300-ton cargoes in steel ships owned and operated by the Pacific Coast Steamship Company, another subsidiary of the Pacific Coast Company. It is unusually uniform in quality, and even with a considerable admixture of topsoil carries 94½ per cent of calcium carbonate. With further development of the quarry the carbonate will run to 97½ per cent and 99 per cent rock is available. The limestone is dense, and it crushes easily.

Clay is obtained from a glacial deposit two and half miles from the mill, and is delivered by truck. Coal is furnished by the Pacific Coast Coal Company, and is delivered by the Pacific Coast Railroad Company, both subsidiaries of the Pacific Coast Company.

Gypsum is purchased from the Standard Gypsum Company, and is delivered by truck.

Clay Department

The plant layout is such that a clay storage building can be added if it is found to be necessary or desirable. At present, clay is mined with a gasoline shovel, and is delivered by 5-yd. trucks, which dump their loads directly into the wash-mill or into a storage pile from which it is fed to the washmill by the hammerhead crane.

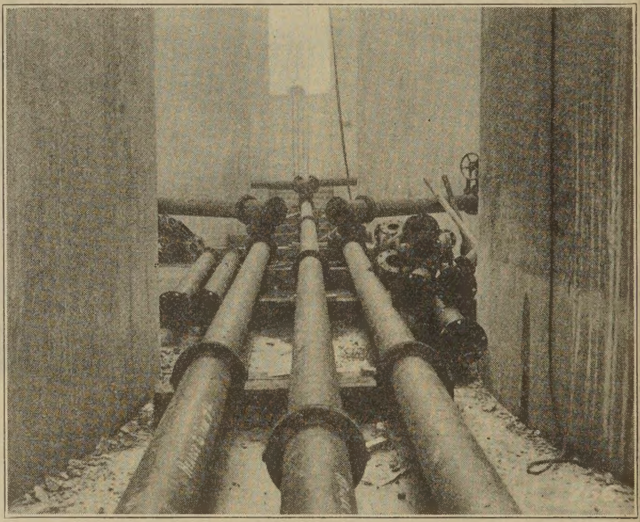


Showing the clay truck dumping directly into the washmill at the Pacific Coast plant

The 26-ft. Traylor washmill is driven by a 75 h.p. G. E. 2300-volt motor, through an Allis-Chalmers Texrope drive. The reinforced concrete setting is similar in design to the slurry tanks. A 4-in. Wilfley pump, driven by a 25 h.p. Westinghouse motor, delivers the clay slip to either of the two clay slip tanks adjacent to the washmill. Each tank will hold sufficient clay slip to make 6000 barrels of clinker. Ordinarily, 98 per cent of the clay slip will pass a 200-mesh screen, and there is sufficient material of colloidal fineness to prevent segregation without excessive agitation.

Raw Grinding

Crushed rock is delivered by either the hammerhead crane or by a 9-ton Milwaukee bridge crane to reinforced concrete bins, and from them, is fed by Schaffer poidometers to the Traylor three-compartment mills, 7 ft. in diameter and 45 ft. long. The clay slip, closely regulated as to water content, is measured into the mills by Traylor ferris-wheel feeders; and the rock and clay are so closely controlled that slurry of the required composition is produced by the mills. This is accomplished by driving the ferris-wheel from the poidometer at a fixed speed ratio, regulating the number and position of the buckets on the ferris-wheel to make the two machines deliver materials in approximately the correct ratio, and adjusting the poidometer to make the lime content of the mill output exactly that required. The rate at which the mill is fed is determined by controlling the speed of the phase-wound poidometer motor through Allen-Bradley carbon-pile controllers.



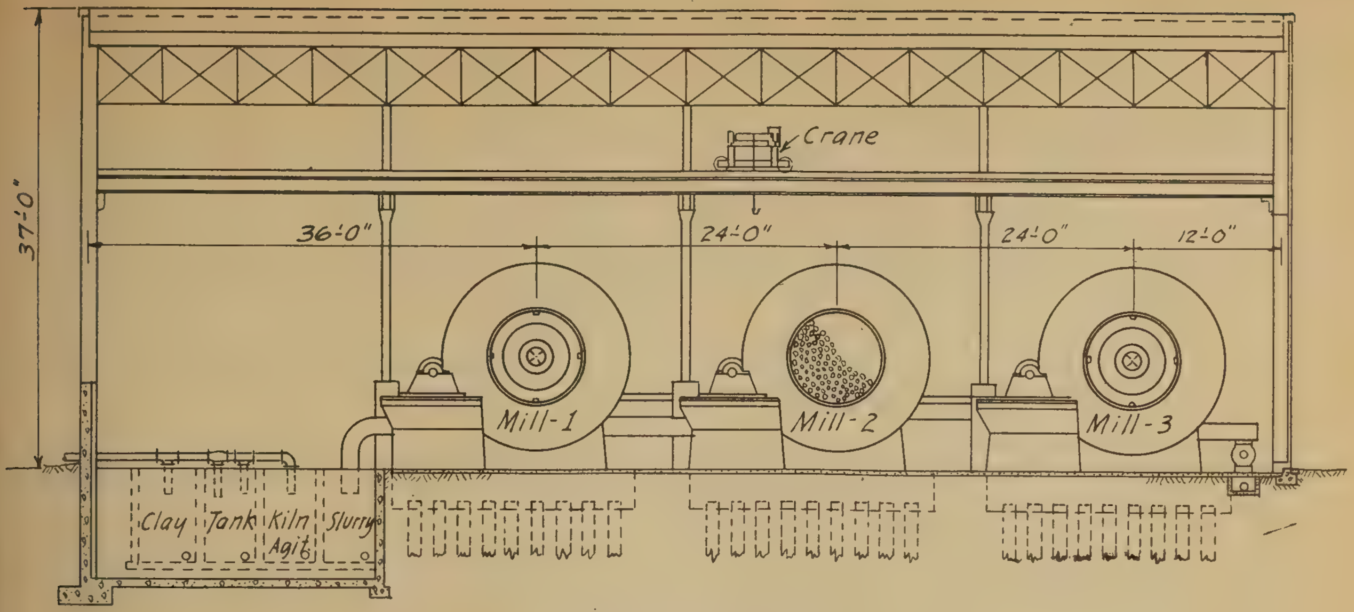
Slurry pipes 8 in. in diameter lead from the tanks to the pump sumps in the mill building

Each mill is driven by a G. E. super-synchronous, 2300-volt, 3-phase motor, rated 750 h.p. at 90 per cent power factor, and 40-degree temperature rise. A 54-in. pin-and-belt flexible coupling is used between the mill pinion shaft and the short, single-bearing shaft extension, which is rigidly coupled to and carried on the same foundation with the motor. The mill and motor foundations were described in the December, 1928, issue of CONCRETE.

Grinding bodies range in size from 4-in. Lorain steel balls to ⅝-in. by ⅝-in. heat-treated steel slugs, furnished by the Philadelphia Steel Company.

Slurry Department

Slurry from the raw mills is carried by a 16-in. screw



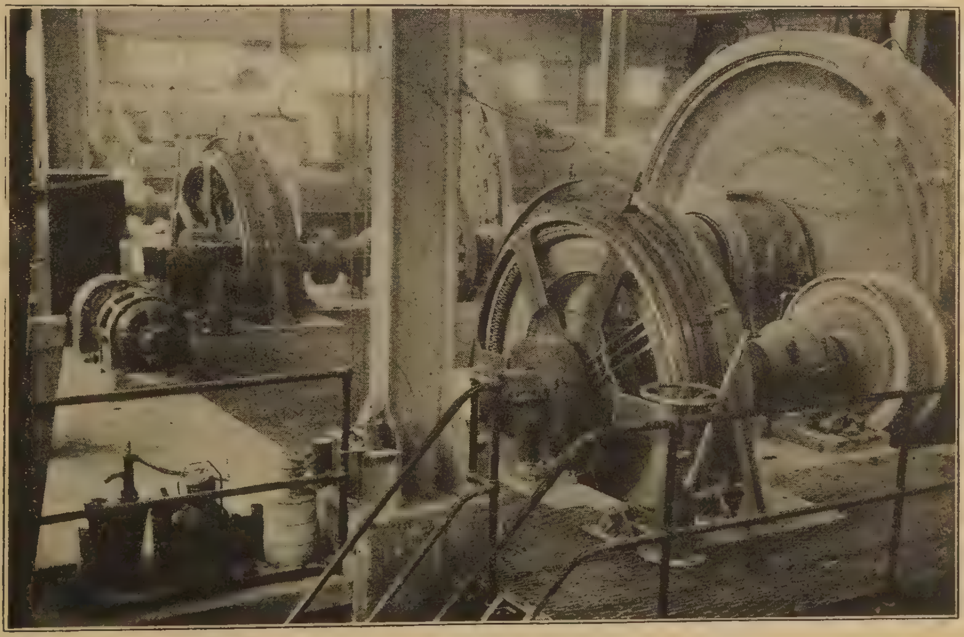
Cross-section of mill room

conveyor to one of four concrete sumps above a depressed pump pit provided for four Wilfley 4-in. slurry pumps. The first of the pumps takes the product of the raw mills, and delivers it to any one of the four slurry tanks. The second pump, normally used to transfer slurry to the kiln tank, is so connected that it can relieve the mill pump if necessary. The second and third pumps can pump slurry from tank to tank for blending, if necessary, or from storage tank to kiln tank. The fourth pump circulates clay slip through the ferris-wheel feeders at the raw mills, the surplus returning to the pump sump.

The clay slip and cement slurry tanks are identical. Each is 36 ft. in diameter and 29 ft. deep. The 8-in. reinforced concrete shells, resting on 12-in. by 24-in. annular footings, were first put up with sliding forms by the Macdonald Engineering Company. After being backfilled to a proper elevation, separate, reinforced tank floors were put in, an asphalt seal forming the connection between shell and bottom. Each tank is provided with a Dorr mixer, driven through a Philadelphia reduction gear by an Allis-Chalmers 10-h.p. motor with an Allen-Bradley starter.

One 8-in. pipe line from each of the four cement slurry tanks, and one 8-in. pipe line from the two clay slip tanks enter the mill building, and pass over the sumps above the pump pit. Barco lubricated plug valves are used to throttle the slurry into the sumps at proper rates to maintain the desired head on the Wilfley pumps, and a Record gate valve is used as a cut-off valve at each tank. By this arrangement, the control of the flow of slurry from the tanks is centralized at one place in the mill building. Where pipe lines change direction, two tees are used, each with a blind flange on the dead end, so that the straight runs of pipe can be blown out with air or water, or can be rodded, if necessary.

(To be continued in an early issue)



A general view of the mill room, showing the connections between the dry mills and the outdoor dust arrester

Plants Take Pre-Campaign Training in Safety

During March a majority of American cement plants entered into a program of accident prevention and first aid training as preparation for the annual no-accident campaign in June. The present program is to extend through April and May as well. It is promoted by the Committee on Accident Prevention and Insurance of the Portland Cement Association, in co-operation with the United States Bureau of Mines.

It is expected that so far as practical one of the Bureau's ten first aid or rescue cars will be sent to every enrolling plant. Instruction will include practically every phase of first aid training and accident prevention.

By the middle of March, 16 courses had been scheduled for Pennsylvania plants. They will be held at the Allentown Portland Cement Company's Evansville plant; Alpha Portland Cement Company's two mills at Martins Creek; the Bessemer plant of the Bessemer Cement Corporation; the Egypt plant of the Giant Portland Cement Company; Hercules Cement Corporation's mill at Hercules; Lehigh Portland Cement Company plants at Bath, Fogelsville, Ormrod and Sandt's Eddy; the Philadelphia mill of the Lone Star Cement Company, Pennsylvania; the Nazareth Cement Company's plant at Nazareth; the York mill of the Sandusky Company, Universal Cement Company's Universal mill; the Valley Forge Cement Company's plant at Conshohocken, and at the West Winfield plant of the West Penn Cement Company.

California Cement Production's Importance Grows

Production of cement in California is becoming of increasing importance in the gold-mining country of the Sacramento valley. The California Development Association has compiled a report on industrial and structural minerals, as well as on gold, which shows that in 1927, $4,808,169 in the former was produced in that region, while the gold output was valued at $10,393,264. The 1928 totals are expected to show an even greater production of commercial minerals.

"Sacramento valley's industrials and structural minerals are destined to bring in a greater revenue than even her gold," George F. McCormack of Sacramento, chairman of the industrial committee for the valley, states.

"The most important of the commercial minerals, in addition to cement, are clay, granite, limestone, asbestos, fuller's earth, graphite and mineral paint," he continued.

"The total output of cement in California is approximately 14,000,000 barrels, and the principal sources of limestone and clay are found in the Sacramento valley."

Improved British Cement Prospects

Final dividends just declared by the Associated Portland Cement Manufacturers and its chief subsidiary, British Portland Cement Manufacturers, bring the distributions of the year to 8 per cent and 15 per cent respectively —the same as for 1927.

It is known that the cement war which prevailed in the first half of 1928 was a costly business for those engaged in it, and therefore the maintenance of the dividends by the "Blue Circle" group may be regarded as an achievement of good augury for the shareholders now that the companies are working harmoniously with their rivals. The dividend of the Associated Company is now payable on a larger capital.

Regional Safety Meeting for Plants in Iowa and Vicinity Held

Another of the Portland Cement Association's regional safety meetings was held on March 20th at Mason City, Iowa, with at attendance of 136 persons.

The morning session was opened by G. C. Blackmore, of the Northwestern States Portland Cement Company, who acted as chairman, and as such introduced the Hon. A. L. Urick, of the state department of labor. His talk was followed by one by Dr. T. E. Davidson on "The Doctor's Part in Accident Prevention." Stanley Griffiths, mill foreman at the Pyramid Portland Cement Company plant at Des Moines, then told of their successful safety trophy campaign.

C. E. Davis of the local Lehigh plant presided at the luncheon, introducing Frank T. Vasey, superintendent of schools at Mason City.

The afternoon session began with an address by Joseph V. Mandia, supervising chemist of the Hawkeye Portland Cement Company, who told of the study of lost-time accidents in mill and quarry made there during 1928. The value of first aid training was then outlined by W. D. Ryan, safety engineer for the U. S. Bureau of Mines, at Kansas City.

Safety in plant departments was discussed by the following: J. H. Gaynor, of Lehigh, on the quarry and crushing departments; H. Krarup of Hawkeye, on the raw, burning and finish departments; E. N. Dodd, of the Pyramid plant at Des Moines, on the power, shops and repair departments; E. F. Tyler of the Dewey Portland Cement Company at Davenport, Iowa, on the packing, shipping and storage departments; Gordon Huth of the Universal Company plant, and George A. Smith of the Northwestern States plant, on the coal grinding and handling departments.

A first aid demonstration followed this discussion.

The evening was taken up by the annual safety dinner, at which E. H. Wagner, president of the Mason City Chamber of Commerce, was the toastmaster. At this time an address was given by the Hon. G. E. Cress, sheriff of Cerro Gordo County, Iowa.

G. C. Blackmore, O. E. Davis and C. L. Murray were on the committee of arrangements.

Safety Director's Work Outlined

"A sincere personal interest in human relations, enthusiasm, and ability to become a friend and leader of men have proven paramount qualifications of the successful safety director," according to Industrial Safety booklet No. 3, just issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Company.

Addressed primarily to the chief operating official, it deals with the need for competent direction of safety activities in both large and small organizations and outlines the qualifications, duties and functions of the safety director.

This booklet is one of the most valuable in a series presenting the basic principles of successful industrial safety work. The two previous releases in this series are: "Getting Results from Safety Work," and "Getting Facts About Accidents."

Copies of any or all of the series may be obtained by those interested in accident prevention by addressing the Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City.

The Compeb Mill

as the Modern Grinder for

Cement Raw Materials and Clinker

By BERT. H. PUERNER
Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

In the February issue of "Concrete" appeared an article by A. W. Catlin, under the title, "Grinding Raw Materials and Clinker in the Modern Cement Plant."

In that article Mr. Catlin presented his arguments in favor of two-stage reduction of raw materials and clinker as against single unit reduction.

The other side of the story is being presented this month in the following article. Further discussion of this subject is invited.

A RECENT article claimed high efficiency for a high speed roller type of grinder as compared with ball mills and tube mills, or combination mills. The screen analyses printed with this article indicated that the fineness of material produced with a separate ball mill or the preliminary compartment of a combination mill was only 20 per cent minus the 200 mesh sieve, and 80 per cent minus the 20 mesh sieve when grinding portland cement clinker. These analyses are low and, as will be pointed out later in this article, do not represent results obtained with the compeb mill.

The function of a preliminary grinder is not to produce a large amount of 200 mesh material, but to prepare a feed for the finishing mill which can be efficiently handled by that unit. Theoretically, the ideal grinding condition would be one where all particles at a given point in the grinding would be of approximately the same size, and as the material progressed through the grinding process, different sizes of grinding media could be provided best suited to the material at that particular point. The presence of large amounts of comparatively fine particles before their time creates an inefficient grinding condition on account of cushioning, and the net result is negative unless these fines are removed from the system.

Trend of Grinding Practice

During the year 1928, equipment was purchased for six new portland cement plants in this country. Five of the companies building these new plants decided that our compeb mill was the best grinding equipment to use in the raw and finish grinding departments, and the sixth used compartment mills made by another machinery manufacturer. This is a significant situation which has evolved through years of experience with two stage types from coffee-mill crushers and buhr mills down to high speed roller mills and tube mills, or separate ball mills and tube mills.

One of our largest and oldest portland cement manufacturers has recently provided a convincing example indicative of the trend in grinding practice. For years this organization employed almost solely the two-stage grinding combination of high speed roller mills, followed by tube mills, with the attendant large investment in patterns and manufacturing facilities for repair, renewal and improvement, which is inevitable with high speed preliminary grinders. Having employed this combination for some thirty years, this company, after investigating and using the latest improved type of compeb mill, is employing this type of machine for the raw grinding and finishing departments of a new plant now under construction.

In a new mill which is now being built by another large cement company, using high speed roller mills in the greater number of its plants, the latest improved type of compeb mills will be installed. Two other of the largest cement companies in this country have also recently purchased these improved type compeb mills.

Ten or twelve years ago, the compeb mill stood alone in this country as an example of combined primary and finish grinding in one unit, and it was almost universally opposed by a separate preliminary grinder and tube mill. Today every recognized manufacturer of cement making machinery throughout the world, using a ball mill type of grinder, is offering compartment mills aligned in basic principle with the compeb mill idea.

For the purpose of fairly comparing the performance of the compeb mill with any other grinders which may have been in popular use in years past, the following headings can be used:

1. Flexibility.
2. Power Consumption.
3. Maintenance Cost.
4. Continuity of Service.
5. Uniformity and Quality of Product.

Flexibility

While the popularity of combination mills for dry grinding cement raw materials and clinker has increased steadily, there is one objection which is sometimes offered to their use as dry grinders that cannot be applied to wet grinding raw materials. This objection is that there is a variation in the relative grindability of various materials so that it is not always possible, on account of these variations, to keep the ball mill and tube mill compartments in perfect balance. The success of the combination mill, and especially of the latest improved compeb mill, has demonstrated that there are so many advantages in the single unit that the above disadvantage is of minor importance. The objection described above cannot be offered in the wet grinding of raw material, since it is not commercially practical to store sufficient tube mill feed mixed with water to permit operating one mill and shutting down the other.

The compeb mills now being installed in new plants are fitted with large, accessible outside screens, which efficiently size the material passing to the finishing compartments, and also provide a closed circuit on the first compartments by returning the oversize remaining on the screens to the preliminary compartments at a point where these rejections join material of very nearly the same size passing that part of the mill.

Flexibility and balance have been accomplished in the present compeb mill to a degree surpassing, by virtue of simplicity, any two unit grinding combinations known. It is possible, with the modern compeb mill, to remove or return material at any point in the grinding circuit by means of simple outlet openings and return scoops fitted to the shell of the unit. This feature allows closed circuiting and removal of finished product on as many stages of the grinding as desired, and any temporary or permanent inequality in grindability is adjusted by changing the outside screens or adjusting the classifier in circuit with any portion of the mill. It is logical to conclude that the compeb mill with its inherent flexibility will be prominent in the grinding department of the future where the ideal grinding condition of removing finished material from the circuit as soon as produced will be approached.

Power Consumption

It is admitted that the compeb mill has not in general excelled in the matter of power consumption as compared to two-stage combinations of high speed roller and tube mills. Recent results, however, obtained from the latest types of compeb mills indicate that, even in this matter of power, the compeb mill is making an enviable record. The following results were obtained with a modern compeb mill when grinding medium hard kiln run clinker to the finenesses indicated:

E.H.P.	Bbls. per hr.	Mesh	K.W. hrs. per bbl.
1090	240	83-200	3.39
	198	87-200	4.11
	132	96-200	6.17

The above 1090 electrical horsepower equals approximately 1000 brake horsepower.

Briefly summarized, the factors contributing to the increased efficiency of the modern compeb mill are as follows:

1. Correct peripheral speeds for both the preliminary and finishing ends of the mill.

It is a well established fact that preliminary grinding, which is most efficiently accomplished by a cascade action of the balls, requires a relatively higher peripheral speed than finish grinding where an attrition action of the balls is desirable.

This result is obtained in the compeb mill by constructing the preliminary grinding compartment of a larger diameter than the finishing compartment, and connecting the two diameters by means of a taper section.

The taper connecting section is in itself a valuable feature in the construction, as it accomplishes a classification of grinding balls and material at a desirable point in the grinding, and gradually changes the ball action from cascade to attrition where the material is of intermediate size.

2. Accurate sizing of the material passing from the primary to the finishing compartments, and closed circuiting of the primary compartment by means of a large peripheral outside screen. This screen is accessible for adjustment when it becomes necessary to compensate for temporary or permanent changes in grindability.

The compeb mill is designed to use approximately 30 per cent of the total power for preliminary grinding, and 70 per cent of the total power for finish grinding.

As previously pointed out, the feed to the finishing grinding compartments should preferably contain a minimum amount of oversize rather than an excessive amount of very fine material, as the production of this fine material is most efficiently accomplished in the last stage of the finishing process, and its presence before that time has a cushioning effect detrimental to grinding of the large particles in this feed.

The following represents an average screen analysis of the material as discharged from the preliminary compartment of a clinker grinding compeb mill:

Mesh	Per Cent Fineness Passing
20	90.4
40	75.6
60	59.4
80	55.4
100	48.8
200	33.3

With the latest type of compeb mill, where the outside screen is used with openings as small as .055 in., a circulating load is built up in the primary grinding compartment with the desirable result that a product is produced, the analysis of which shows a somewhat larger percentage of material passing the 20 mesh sieve, and all of the material which does not pass the 20 mesh sieve being of a smaller maximum size.

Maintenance Cost

It has been demonstrated that when producing the same output with feed size and product fineness equal, as measured on standard sieves, the maintenance of a compeb mill is less than any two stage grinding combination known to the industry today.

The increased number of grinding units, motors, and elevators characteristic of two-stage reduction logically results in more maintenance expense. In maintenance expense are included operating labor, repair labor, repair and operating supplies, and grinding media.

The compeb mill shows up particularly well when compared to a combination of high speed roller mills and tubes. The following tabulation obtained from actual mill records represents the average comparison of the two types above mentioned:

	CLINKER GRINDING	
	Modern Centrifugal Type Roller Mills and 7 x 26 Tube Mills	8740 Compeb Mills
Process of plant	Dry	Wet
Production period	1,440,437 bbls.	1,093,025 bbls.
Fineness through 200 mesh	80-82 per cent	88 per cent
*Cost per bbl.	$.0182	$.0086

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*Cost per barrel includes repair supplies, repair labor, and grinding media.

The above figures were obtained from two plants operating in the same vicinity, both using the same limestone, sandstone, and shale.

It will be noted that the compeb mill product is more finely ground than that of the two stage combination.

In addition to the advantage in upkeep cost, the compeb mill is favored by having a lower first cost in the matter of erection, foundations, floor space, simplified building construction, and plant layout.

Continuity of Service

It follows that the equipment having the lowest maintenance cost will necessarily have a better record from the standpoint of continuous operation. Since the major replacements to the compeb mill consist mainly of cast liners and grinding media, the time required for making these replacements is much less than is required in the case of grinders requiring the renewal of machined, close-fitting parts.

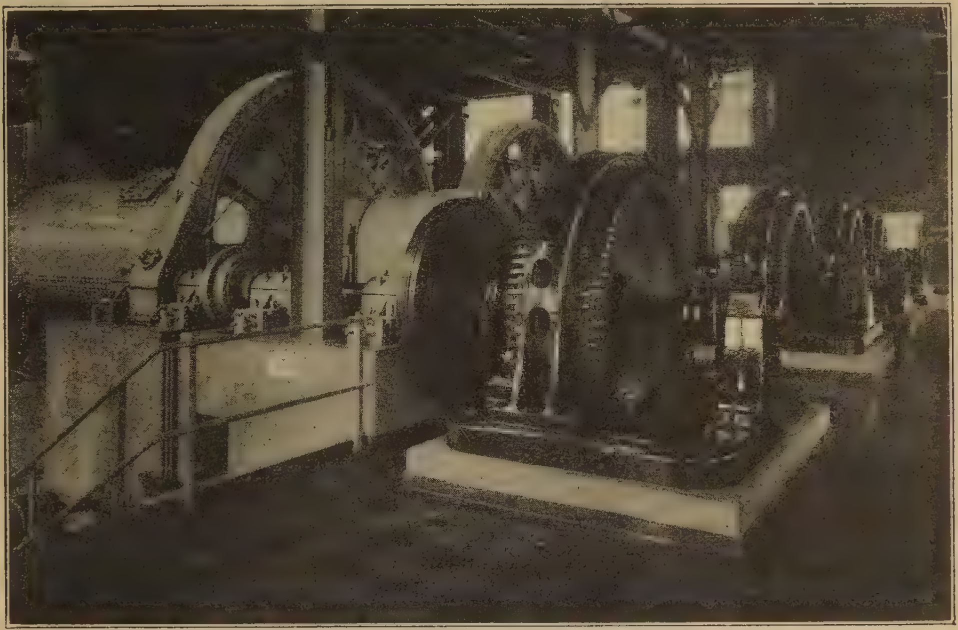
Uniformity and Quality of Product

The product produced by the compeb mill is very uniform in fineness, and this is particularly true of larger sizes of mills. The 10 ft. and 9 ft. diameter by 45 ft. long clinker grinding compeb mill has produced finished cement continuously with an average variation in fineness of less than 2 per cent, as measured with the 200 mesh sieve.

Practically the only factor contributing to sudden changes in fineness is the rate at which material is delivered to the mill. The compeb mill with a single feeder has a better chance, therefore, to produce a uniform product than any two-stage grinding operation with two or more feeders in the system. It is also well-known that it is more difficult to maintain a uniform feed with a 20 mesh material than with a crusher run or kiln run feed.

All other conditions being equal, uniformity in fineness is synonymous with uniformity in quality. This is particularly true in the grinding of raw material, as all fluctuations in the direction of coarse grinding are almost certain to be detected in the form of incomplete chemical combination of the resulting clinker.

If experience is acknowledged as a good teacher, and current practice of many of the old as well as practically all of the new operators in the industry is admitted as the criterion of grinding practice, no further brief need be offered for the compartment mill as the modern grinder.


A modern compeb mill installation

Indiana State Cement Plant Commission Proposed

Members of the Indiana senate are considering the provisions of a measure introduced by Senator Bruce Cooper for the establishment of a committee to investigate the question of a state-owned cement plant operated by prison labor.

The measure would establish a commission of three senators and two house members, three to be named by the governor and one each by the lieutenant-governor and the speaker of the house of representatives. A $30,000 appropriation for the commission and an additional $40,000 to obtain options on sites are provided.

The commission would have the power to secure and renew options on materials and plant sites taken in the name of the state. These would be so worded that they would expire not earlier than January, 1932.

National Company Plant for Houston, Texas

Houston, Texas, will be the site of the first of a national chain of cement plants built and operated by the National Portland Cement Company, of that city, if its present plans are realized.

It is now arranging for the erection of a $100,000 plant for manufacturing 250 barrels of white cement there daily. Raw material will be secured in the lower Sierra Nevada mountains in California.

Officers Re-Elected

Robert B. Henderson, president of the Pacific Portland Cement Company and other officers and directors were re-elected at the annual meeting on March 1st, at San Francisco.

More than 200 safety enthusiasts attended the banquet that closed the regional safety meeting at La Salle, Ill.

Hold Enthusiastic Safety Meeting at La Salle

On February 26th, the fourth 1929 regional safety meeting of the Portland Cement Association was held at La Salle, Ill. Representatives from the Alpha Portland Cement Co., the Lehigh Portland Cement Co., the Marquette Cement Manufacturing Co., the Missouri Portland Cement Co., the Sandusky Cement Co., and the Universal Cement Co. attended. John Young, superintendent of the Oglesby mill of the Lehigh Portland Cement Co., acted as chairman of the meeting.

Eye Safety Discussed

Two of the principal speakers of the meeting discussed the subject of eye safety. Dr. R. H. Woods, an eye, ear, nose and throat specialist of La Salle, described by means of charts how the eye functions, how injury affects it, and how injury can be prevented. He gave examples of cases where eye injuries had been entirely eliminated in manufacturing plants and gave detailed instructions for reducing the number of such accidents in cement plants.

Walter Darling, of Cincinnati, was the second speaker on this subject. Mr. Darling, who lost his own eyesight in an industrial explosion several years ago, is now devoting his entire time to saving the eyesight of others. He made a forceful plea for carefulness and told of the great cost paid when blindness results from carelessness.

The Program

The following list of subjects and speakers indicates the scope of the subjects discussed. The clubrooms at the top of the Hotel Kaskaskia, where the meetings were held, were filled to overflowing and even the corridors held some of the men who were anxious to add to their knowledge of safety precautions.

A. J. R. Curtis, assistant to the general manager of the Portland Cement Association, spoke on "Improving Our Safety Records."

M. P. Greer, safety director, Marquette Cement Manufacturing Co., told "How the Cape Girardeau Plant Won Its Safety Trophy."

H. H. Brewer, plant engineer, Alpha Portland Cement Co., La Salle, led a discussion on "Organization of the Plant Safety Committee."

F. H. Sass, manager, Department of Safety and Relief, at the Buffington plant of the Universal Portland Cement Co., spoke on "Instruction and Protection of New Employees."

R. D. McElhaney, quarry foreman at the Oglesby mill of the Lehigh Portland Cement Co., discussed "Quarry Hazards and Precautions."

J. W. Temns, chief electrician at La Salle for the Alpha Portland Cement Co., had "Preventing Electrical Accidents" as his subject.

Frank Baumgardner, power engineer for the Marquette Cement Manufacturing Co. at La Salle, told about "Erection of Heavy Machinery Without Accidents."

W. E. Gorg, assistant treasurer, Missouri Portland Cement Co., St. Louis, spoke on "Accident Statistics and How to Utilize Them."

A. V. Miller, engineer, U. S. Bureau of Mines, Vincennes, Ind., discussed "First Aid Training as an Accident Preventive."

The Banquet

The meeting closed with the safety banquet held the evening of February 27th at the Kaskaskia Hotel. Approximately 200 men were present. The Four Nighthawks, of Chicago, provided entertainment and led the singing of the safety songs. H. McClarnen, general superintendent of the Alpha Portland Cement Co., acted as toastmaster.

The address of the evening was given by James E. Gorman, president of the Chicago, Rock Island and Pacific Railway. Mr. Gorman spoke of the work of accident prevention as it was carried on by the Rock Island and pledged anew his personal efforts to help make that work more effective.

Spain Reduces Duty on Cement

It is announced that the Spanish government has decided to reduce the customs duties on cement imported for important building and public works projects. This new regulation will be particularly favorable to the French cement industry, which already finds an important market in Spain.

~ EDITORIAL ~

Obsolescence

THE "life" of any machine or manufacturing plant may be defined as its period of economic usefulness. Decreasing usefulness may be due to wear and tear on the equipment itself, or it may be due to the necessity for replacing the old with the newer and better types or designs of equipment that are coming into use. The first of these causes is usually termed depreciation, the second, obsolescence.

Provision is undoutedly made in all cement company accounting systems for depreciation, but it is probable that the vital factor of obsolescence is sometimes entirely ignored or is considered only in an indefinite way along with the general provisions for depreciation.

Many industries have been forced to give this matter of obsolescence sudden and serious attention. Fundamental changes in equipment and manufacturing processes have been forced upon manufacturers by new inventions in some industries in the past and may be again in the future. In the light of such changes obsolescence becomes an important item.

Even when changes are not of such a revolutionary character—when changes in equipment design or in manufacturing processes are simply the result of the natural evolution of the industry, it is often expedient to replace equipment long before it has actually worn out.

Obsolescence must be given a new meaning in the cement industry, as it has already in some other industries. Progress in equipment design is steadily going forward: New qualities in cement are requiring new equipment. Refinements in control and in manufacturing methods are calling for machinery designed particularly for those improved processes.

The industry must be able to adjust itself to these new demands without serious discomfort. It must be prepared financially through a provision for obsolescence to take advantage of new opportunities in improved machinery or methods as they become available.

A life of fourteen years for a unit of cement mill equipment may be a fair estimate from the standpoint of depreciation. But it may be entirely unfair from the standpoint of obsolescence. A few years may be enough to make it worth while to discard the equipment and install more efficient types. From a plain dollars and cents analysis, the new equipment may be preferable.

We have not yet reached the ultimate in cement plants. Improvements in equipment design may still be expected. It is not inconceivable, even that fundamental changes in manufacturing processes may occur. A cement plant is never "complete." Always there are improvements that still ought to be made. And they will continue to come. There is no standing still.

Those manufacturers who have learned to expect changes; who know that it is a part of their operating cost to keep the mill modern and who anticipate those replacements and improvements in some manner in their accounting system, are prepared.

Spreading Safety Enthusiasm

NO one attending any of the regional safety meetings conducted under the auspices of the Portland Cement Association can help but be engulfed in the enthusiastic wave of safety sentiment that pervades such a gathering. No wonder new safety records are made constantly.

So contagious has this urge become that the safety bug is reaching out and inoculating men outside the cement industry. When men are fired with the enthusiasm of a worth while work it is inevitable that some of that enthusiasm will affect others.

Here is where the cement industry has a rare opportunity for service to other industries. Wholesome good will cannot help but result. Not by example alone but by active propaganda can the safety men of the cement industry rouse the enthusiasm for safety work which is so necessary before results can be secured in other industries.

The recent La Salle, Illinois, regional safety meeting provided a striking example of this. The president of the Rock Island Railroad, who was a guest and speaker at the safety banquet, became so imbued with the safety enthusiasm that he pledged his renewed personal help in putting over the railroad company's safety program.

The active personal support of the principal executives is needed to give impetus to such a movement. In the cement industry the executives have gotten behind it and, by their example and the example of the results obtained, they are enlisting the more active co-operation of executives in other lines.

Business, after all, need not be such a mechanical, impersonal thing. The big things accomplished are the results of enthusiasm and example—very personal qualities. The accomplishment of a great humanitarian effort like safety has its own ample rewards. And it brings with it a responsibility to industry as a whole.

Effect of Temperature on Grinding of Dry Materials

Causes of Changes in Size and Quantity of Output—Effect of Grading of Grinding Media——Effect of Moisture—How Much Heat is Generated in Grinding?—Relation of Moisture to Heat—Behavior of Heated Particles—Conclusions

By **MARC ELBER**
Chemical Engineer

ACCORDING to M. de Lapalisse, the study of grinding constitutes one of the principal branches of study in cement manufacture. A number of engineers are recognized authorities in this field, particularly among machine designers, as they are primarily interested in selecting for their machines dimensions, which, together with a lowest possible cost of installation, insure the best output from the point of view of production as well as that of energy consumed.

The manufacturer receives his mill in an almost entirely assembled condition in most cases, where it conforms to the guarantees of the machine designer. This does not always mean that he will never be confronted by some unexpected difficulty—for are they not all unexpected? For some unknown reason, sometimes a mere trifle, the mill, which up to that time has functioned satisfactorily, suddenly ceases to yield the desired fineness, or yields it only with a simultaneous decrease in production.

Ordinarily, if the nature of the materials has not been changed, one suspects the charge, checking it, varying the weight and size of the balls, pats, cylpebs, generally without appreciable results.

Grading of Grinding Media

As one becomes familiar with the laws governing the "optimum" respective dimensions of the grinding agents and the material to be ground, one is convinced that the formulas thus derived cannot be accurately applied in practice, for they would necessitate a continuous range in the sizes of both, insuring that no particle is attacked by a charge too great or too little in proportion to its own size, which would result, in the former case, in an exaggerated expenditure of effort, considering the result desired, and, in the latter case, in an expenditure of effort without useful results.

Compound mills, in which the charge is graded by being enclosed in separate compartments, according to size, and conical mills, which obtain this gradation automatically due to the shape of the mill, are based on the same principle and definitely mark progress in the practice of grinding, for they introduce a definite relation between the charge and the size of material to be ground. However, they present only an approximate solution of a problem, which theoretically requires an integration almost to infinity.

Within this approximation, the composition of the charge may vary over a more or less extended range, but, though its nature is of importance, it should not be made the deus ex machina of grinding.

There are a great many factors which influence grinding, aside from the physical nature of the material to be ground, which will be assumed here as fixed in all cases.

Effect of Moisture and Heat

When we are concerned with the grinding of dry materials, the degree of moisture is of utmost importance. Is there anyone who has never had the experience of a mill stopped by the clogging of insufficiently dry materials?

It is commonly known that good drying increases the output of the mill. Yet, it has occurred to the author, and to a great many others no doubt, that drying carried to the extreme produces results opposite to those desired. While the mill no longer becomes clogged, it seems impossible to obtain the desired fineness, even when feeding is decreased to a point lowering production to an impractical figure.

What happens in a case like that? Every time we were faced with these conditions, we were able to establish a rise in temperature inside the mill. In up-to-date mills of great capacity, the material leaves the mill at a temperature frequently reaching 100 deg. C. It is caused by the impact of the balls constituting the charge. Only a small part of the force acquired during the descent of the latter is absorbed by the actual grinding, the remainder becoming transformed into internal work (permanent deformation in the charge) or into heat.

The high capacity of these mills is reached by increasing the dimensions, particularly the diameter, so that the greater height of drop produces a greater quantity of useful work, which, however, is accompanied by greater quantities of liberated heat.

Amount of Heat Generated

As the surface of radiation of a mill is proportional to its diameter, while the heat generated by the impact of the balls is approximately proportional to the square of this diameter, it follows, that an excess of heat is created with an increased diameter, which cannot be entirely eliminated by radiation. Part of this surplus heat remains in the interior of the mill and increases the temperature to a point which has caused designers of mills to provide cooling devices (generally by the circulation of water) for their mills.

(Translated from Revue des Mat. de Constr. et de Trav. Publ., December 1928).

The author has personally observed temperatures above 150 deg. C. at the discharge end of the mill, under conditions described below. Every time this was accompanied by higher sieve residues than normally expected in practice for given feeds. All efforts to improve the fineness by reducing the feed only aggravated the difficulty, registering a further rise in temperature and still higher sieve residues.

These temperatures were caused by admitting to the mill clinker recently drawn from the kiln and still hot, or a raw mix dried and insufficiently cooled afterwards, or, most frequently, by a fact which will be treated in detail below. The results were identical in all cases.

The second case above reminds one of a conclusion made by Young of Yale University on the basis of tests carried out under his direction on a Hardinge conical mill: "The output is less favorable with dry materials than it is with moist materials."

What is the scientific explanation of this phenomenon? One may suppose the following: the material which is to be ground, already reduced to a certain fineness, may be considered as a suspension of solid particles in a gaseous medium, the air. As the coefficient of expansion of a gas is enormous compared to that of solids such as we are discussing here (about 0.000015 to 0.004, or 270 times greater), increasing temperature produces an increase in the kinetic energy of the air molecules separating the solid particles, causing further separation of the latter and thus diminishing their chances of being at the point of contact of two grinding agents at the moment of impact.

It is conceivable that the presence of a little moisture is favorable to grinding, for, as the density of moist air is lower than that of dry air, the solid particles are less easily held in suspension in moist air and tend to approach one another, diminishing the quantity of gas between themselves and increasing their chances of being hit by the falling change. Increased temperature would result here in an elimination of the last traces of moisture present normally in all bodies, even when dried and cooled in air, for the hygroscopic state of the latter is never zero.

A fact encountered in daily experience gives us a passably exact idea of what happens at the interior of a mill. In discharging the dusts of a rotary kiln, one is impressed by the mobility of the hot dusts recently admitted from the kiln. The attendant workmen say that they flow like water and share with the fluids the property of passing with extreme facility through the most intricately shaped orifices. Their angle of repose, when piled, though not horizontal, is far inferior to that of normal dusts. When in this condition, they present little resistance to the passage of a weight through their mass. A thrust of the shovel in a pile of hot dusts extracts a negligible quantity, the greater part flowing ahead of the penetrating shovel. Yet in a few days—if not a few hours— one finds around a dust pile a mass of solidified matter, on which one is able to walk without leaving traces of any depth. Yet in determining the moisture in the hot condition and upon cooling, one finds only a slight increase.

Mobility of Heated Particles

Inside the mill, pulverized materials, in becoming heated, acquire that mobility which causes them to flee before the charge, which is to crush them. They rebound and spatter in all directions for considerable distances. Part of this material, through a series of rebounds, arrives at the discharge end of the mill in a few minutes, having most of that time dodged the impact of the charge and of the cylpebs, and, therefore, not as yet reduced to the desired fineness. In this case, a decrease in the feed of the mill cannot furnish a remedy; with a small quantity of material the external work of the charge becomes more and more reduced; the internal work due to the mutual impact of the balls increases and, with it, increases the temperature; the mass becomes more and more mobile and does not acquire the desired fineness.

It follows, that, in order to increase the output of a mill, one must first avoid, as much as possible, a rise of temperature inside the mill. Naturally, only perfectly cooled materials shall be admitted to the mill, for, if one begins by feeding to the mill material already containing a considerable number of calories, these added to those developed by the work of the charge will carry the inside temperature to a degree altogether incompatible with rational grinding.

Prevent Heating of Particles

The evolution of heat during the impact of the charge being inevitable, it is logical to look for some method of eliminating this heat as it is produced. This method is in existence and is applied widely, though with somewhat variable results; it is ventilation of the mill. It serves a double purpose, one end tending to offset the other quite largely.

A circulation of air, produced inside the mill either by a fan or by suction, has the same function as in an air separator. The finest particles are carried beyond the mobile mass and are directed towards the discharge end; they are thus eliminated from any additional—superfluous —action of the charge and the work of the latter can be concentrated more usefully on the particles which have not yet attained the desired fineness. Also in compartment mills, an air current serves to clear the openings of the diaphragms, which are always in danger of becoming clogged by accumulations of dust in the narrow slits which afford passage from one compartment to the other; the circulation of material is thus facilitated to the advantage of the output, while the danger of clogging is simultaneously diminished.

In addition, the air, passing through the entire length of the mill, becomes loaded not only with the dusts, but

TABLE OF FINENESSES AND OUTPUTS

Time	Output tons/ hr.	Per Cent ret. on 4900-mesh sieve	Temperature deg. C.
0	15.0	6.2	38
0.30	15.0	6.6	51
1.00	15.0	8.4	66
1.30	15.0	10.2	78
2.00	14.5	12.6	98
2.30	12.5	14.1	112
3.00	9.2	18.4	138
3.30	8.4	19.5	142
4.00	8.0	19.6	152
4.30	6.2	19.2	154
5.00	10.4	19.8	156
5.30	12.0	19.2	155
Upon adjusting ventilation			
6.00	13.5	19.0	153
6.30	14.0	17.1	141
7.00	14.0	15.2	128
7.30	14.0	13.4	111
8.00	14.0	12.2	101
8.30	15.0	11.6	96
9.00	15.0	11.2	94
9.30	15.0	11.4	91
10.00	15.0	11.2	95
10.30	15.0	11.6	93

also absorbs the greater part of the calories liberated during the grinding process; it thus provides intensive and continuous cooling of the mill and of its contents.

From this point of view, open circuit ventilation is preferable to a closed circuit. It is the only method that can be applied to the grinding of imperfectly dried products.

Conclusions

In conclusion, we append a table of finenesses and outputs, as well as temperatures observed in a series of tests of grinding clinker in a compound mill with insufficient ventilation. The decrease in production is caused by an intentional decrease in the feed; contrary to what might be expected, the fineness does not improve with diminished production. On the other hand, the effect of temperature on fineness can be seen clearly; it seems to be inversely proportional to the latter; it is quite independent of the output. The fineness was determined every half hour; at the same time, the output was registered by an automatic device. Upon establishing sufficient ventilation in the mill, the fineness became stabilized at 11 per cent residue on the sieve with 4900 meshes per sq. cm., the output at 15 tons per hour and the temperature of the cement at the discharge of the mill at 90-95 deg. C.

Cement Market in the French African Colonies

Since the late war France has been turning more and more to her large colonial possessions in Africa as an outlet for her surplus products. While most of these colonies are extremely rich in rare woods, fruits and various other products they are practically devoid of lime-bearing rock or cement deposits. Small lime deposits in Senegal and the Soudan are the only exceptions. Expanding colonization, the growth of cities and towns and the necessity of huge port and harbor projects have created a heavy demand for cement and other building materials which France, at the present moment, is incapable of supplying

The importance of the importation of cement in the French African colonies increases from year to year in keeping with the activity in building operations. From 15,977,682 kilos (approximately 16,000 tons) in 1923, importations increased to 16,698,769 kilos (approximately 17,000 tons) in 1924, and jumped to 19,221,000 kilos (a bit over 19,000 tons) in 1926. The increase in the importation of lime has been less notable: From 10,351,772 kilos imported in 1923, the tonnage increased to 11,921,000 kilos in 1926—an increase of only 1,500 tons.

Senegal is the most important of the French African colonies with regard to the consumption of cement. Important building, harbor and dock projects of ever increasing magnitude are responsible for this growing market, which absorbed 47 per cent of the cement shipped to the African colonies in 1925. Dahomey follows closely with a consumption of 19 per cent; then the Ivory Coast, the Soudan and Guinea with respectively 13 per cent, 9 per cent and 9 per cent.

The principal furnishers of the colonies are France, Belgium, England and Germany. The principal cement firms of France exported to the colonies in 1925, 12,582,591 kilos of cement, or 68.4 per cent of the imports. Belgium took second place with 5,454,727 kilos; England and Germany following with 232,526 kilos and 100,760 kilos.

Italy, which furnished something more than 600 tons in 1923 and 200 tons in 1924, does not appear in the lists of exporters to the colonies after that year.

Cement for the ports and coastal towns of the African colonies may be packed in jute sacks of 50 kilos, or 100 lbs. Cement destined for the interior, to avoid loss in handling, is packed in wooden barrels of 100 to 180 kilos. Cement "fondu" is shipped in metal barrels of 180 kilos.

Customs duties on cement and lime are not complicated nor very high. In French Senegal, Guinea and Soudan, cement from France is assessed 5 per cent ad valorem and cement from foreign countries 12 per cent ad valorem. In the Ivory Coast and Dahomey the duty is uniformly 12 per cent for either French or foreign cement.

New Idaho Plant to Begin Operation in May

May 15th has been set as the date for beginning operation of the Idaho Portland Cement Company plant at Inkom, near Pocatello, Idaho. Ground was broken September 27th last.

Railroad tracks have been built from the main line of the Union Pacific to the quarry and from there to the plant. Two power shovels are installed at the quarry.

The present installation is being made on the basis of a daily capacity of 1500 barrels and the total cost of the plant, together with initial working capital, is about $5,000,000. The capitalization consists of 5,000 shares of 7 per cent preferred stock and 6000 shares of no par common stock.

Southern Cement Company Adding to Plant

The Southern Cement Company at Birmingham, Ala., has engaged the Burrell Engineering and Construction Company, Chicago, as the designer and builder of an addition to its plant.

Plans include a unit for bulk cement, four reinforced concrete cylindrical bins with three interbins, as well as a bagging and shipping unit.

The Southern Cement Company produces 2,000 barrels of "Magnolia" brand daily. H. R. Sanson is president.

Calaveras Increases Capital Stock to $3,000,000

According to articles filed on March 2nd, with the county in which it is located, the total authorized capital stock of the Calaveras Cement Company is increased to 30,000 shares preferred stock at $100 per share, and 180,000 shares of common stock without nominal or par value.

The total authorized capital stock of the company was formerly $2,000,000 and 120,000 shares of common stock without par value.

Penn-Dixie Doubles Output at Georgia Plant

Following curtailment of operation at the Kingsport, Tenn., plant of the Pennsylvania-Dixie Cement Corporation, production at the Clinchfield, Ga., plant has been doubled.

This move is accounted for by the reduced cost of operation in Georgia, effected both by the proximity of raw materials and cost of labor.

Cement Statistics for February

Shipments 17 Per Cent Below Those of February, 1928—Production Decreases 3 Per Cent—Plants Operate at 47.5 Per Cent of Capacity During February

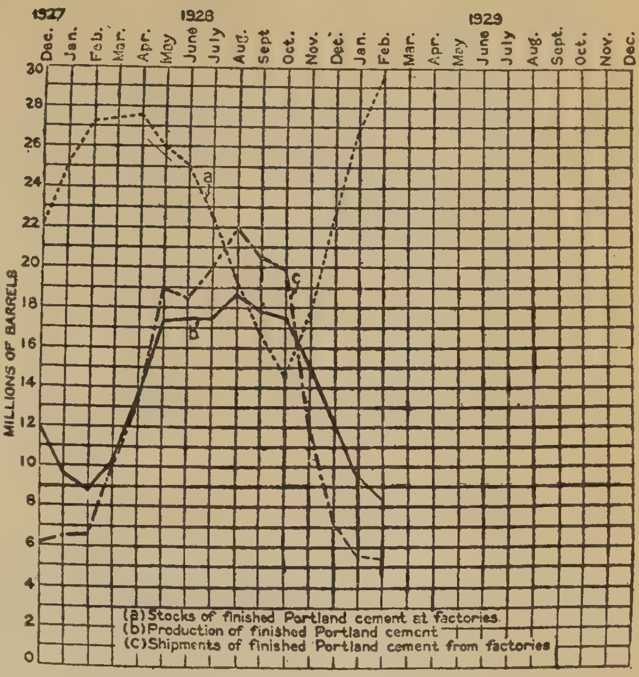
NOTE: IN ORDER THAT THE READER MAY KNOW THE TREND AT A GLANCE, THE HIGHER FIGURE, WHETHER FOR EITHER YEAR, UNDER ANY CLASSIFICATION APPEARS IN SLIGHTLY HEAVIER TYPE.

Relation of Production to Capacity

(Figures represent per cent)

	February 1929	February 1928	Jan. 1929	Dec. 1928	Nov. 1923
The month	44.8	**47.5**	46.5	60.4	77.4
The 12 months ended	71.0	75.1	71.0	74.0	74.1

	1928	1929	Increase or Decrease, Per Cent
Production, Feb.	**8,797,000**	8,522,000	— 3.1
Shipments, Feb.	**6,563,000**	5,448,000	—17.0
Stocks at end of Feb.	27,349,000	**29,871,000**	9.2
Total production for year to date	**18,565,000**	18,403,000	—.9
Total shipments for year to date	**13,104,000**	11,155,000	—15.0
No. of plants reporting	155	**160**	



Production, Shipments and Stocks of Finished Portland Cement, by Districts, in February, 1928 and 1929, and Stocks in January, 1929

District	Production—February 1928	Production—February 1929	Shipments—February 1928	Shipments—February 1929	Stocks at end of month 1928	Stocks at end of month 1929	Stocks at end of January, 1929*
Eastern Pa., N. J., and Md.	**2,135,000**	2,199,000	**1,456,000**	1,354,000	6,566,000	**6,933,000**	6,087,000
New York and Maine	305,000	**412,000**	**288,000**	232,000	1,778,000	**1,984,000**	1,804,000
Ohio, Western Pa., and W. Va.	**978,000**	829,000	**487,000**	442,000	3,393,000	**3,611,000**	3,224,000
Michigan	303,000	**525,000**	**319,000**	302,000	2,205,000	**2,658,000**	2,435,000
Wisconsin, Illinois, Indiana, and Ky.	**901,000**	862,000	**578,000**	373,000	3,732,000	**3,911,000**	3,423,000
Va., Tenn., Ala., Ga., Fla., and La.	**1,037,000**	887,000	**922,000**	662,000	1,966,000	**2,180,000**	1,955,000
Eastern Mo., Iowa, Minn., and S. Dak.	**747,000**	678,000	**319,000**	215,000	3,955,000	**4,353,000**	3,891,000
Western Mo., Nebr., Kansas, and Okla.	**487,000**	482,000	**495,000**	311,000	1,647,000	**1,782,000**	1,610,000
Texas	**460,000**	399,000	**423,000**	416,000	460,000	**513,000**	530,000
Colorado, Montana, and Utah	**108,000**	74,000	**85,000**	57,000	496,000	**541,000**	524,000
California	**1,164,000**	1,071,000	**1,016,000**	984,000	764,000	**872,000**	785,000
Oregon and Washington	**172,000**	104,000	**175,000**	100,000	387,000	**533,000**	529,000
	8,797,000	8,522,000	**6,563,000**	5,448,000	27,349,000	**29,871,000**	26,797,000

Production, Shipments and Stocks of Finished Portland Cement, by Months, in 1928 and 1929

Month	1928—Production	Production—1929	1928—Shipments	Shipments—1929	Stocks at end of month 1928	Stocks at end of month 1929
January	9,768,000	***9,881,000**	**6,541,000**	*5,707,000	25,116,000	***26,797,000**
February	**8,797,000**	8,522,000	**6,563,000**	5,448,000	27,349,000	**29,871,000**
March	10,223,000	....	10,135,000	....	27,445,000	....
April	13,468,000	....	13,307,000	....	27,627,000	....
May	17,308,000	....	18,986,000	....	25,984,000	....
June	17,497,000	....	18,421,000	....	25,029,000	....
July	17,474,000	....	19,901,000	....	22,580,000	....
August	18,759,000	....	21,970,000	....	19,374,000	....
September	17,884,000	....	20,460,000	....	16,799,000	....
October	17,533,000	....	19,836,000	....	14,579,000	....
November	15,068,000	....	11,951,000	....	17,769,000	....
December	12,189,000	....	7,834,000	....	22,650,000	....
	175,968,000	....	175,455,000	....	....	....

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*Revised.

MEN and MILLS

Notes from the Field

Schofield Engineer for Colorado Company on Arkansas Plant

G. C. Schofield, who was the engineer in charge of the field work during the construction of the Fort Collins, Colorado, plant of the Colorado Portland Cement Company, has been engaged for the same duties at Saratoga, Arkansas, where the company is erecting another plant.

Coghlan Leaves Southwestern to Join Marquette

R. R. Coghlan, until recently chief chemical engineer for the Southwestern Portland Cement Company at Los Angeles, California, has left that firm to join the Marquette Cement Manufacturing Company, Chicago.

He is now located at that city, as director of research for Marquette.

Mr. Coghlan will be remembered as the co-author of the "Power Plant and Kiln Design and Operation" series of articles that appeared in CONCRETE intermittently for two years beginning in the latter part of 1926.

Lumber Men Present Zahn with Gavel

J. E. Zahn, secretary of the United States Portland Cement Company, Denver, Colorado, has been elected president of the local Rotary club. On this occasion he was presented with a gavel which was made from the "long leaf" pine which served as roofing for the national capitol at Washington for many years. The presentation was made upon behalf of the National Lumber Manufacturers of America.

Arnold Promotes Sale of High Early Strength Cement

T. H. Arnold, who was formerly electrical engineer with the Southwestern Portland Cement Company at Osborn, Ohio, and more recently plant engineer for the General Fireproofing Company at Youngstown has taken up the banner of high early strength cement. He has taken a position with the West Penn Cement Company of Butler, Pa., but is himself located at New York City. The West Penn Company's high early strength cement is known as Binford's "Overnight."

Mr. Arnold was the author, in co-operation with R. R. Coghlan of the articles on power plant design and operation whose appearance began in CONCRETE three years ago and continued until about one year ago.

Behind a Neat Cement Plant Job

The Pacific Coast Cement Company, which recently began operating its plant at Seattle, Wash., described earlier in this issue, is a subsidiary of the Pacific Coast Company. The latter has also marine, engineering, coal, railroad and other industrial interests. As one of the children of this family the Pacific Coast Cement Company project received careful attention at the hands of capable men. A group of them is shown above. They are some of the officials and operating executives of the Pacific Coast Company and its branches, as follows: Left to right, Carl English, purchasing agent; S. E. Hutton, research engineer; T. M. Reeder, assistant sales manager, Pacific Coast Coal Company; Walter Barnum, president; E. F. De Grandpre, manager miscellaneous operations; E. C. Ward, vice-president and general manager; W. H. Green, plant manager, Pacific Coast Engineering Company; N. D. Moore, vice-president in charge of operations; R. W. Smith, chief mining engineer; H. M. Watkins, general auditor; A. F. Marion, manager, Pacific Coast Steamship Company; W. A. Wilson, general superintendent, Pacific Coast Coal Company; Darwin Meisnest, assistant sales manager, Pacific Coast Cement Company, and Wylie Hemphill, vice-president in charge of sales

Kentucky-Ohio-Indiana Safety Meeting

Operating officials and foremen of Kentucky, Indiana and Ohio discussed accident prevention methods, results and plans when they met at Louisville, Kentucky, on March 5th. The meeting was held under the auspices of the Portland Cement Association.

The meeting was called to order by H. D. Baylor, plant manager of the Louisville Cement Company, who introduced Mayor W. B. Harrison of Louisville. Other speakers at the morning session included W. H. Weitnecht, superintendent of the Mitchell, Indiana, plant of the Lehigh Portland Cement Company and A. J. R. Curtis, assistant to the general manager of the Association.

Henry S. Gray, secretary-treasurer of the Louisville Cement Company, presided at the luncheon, when J. G. Ellis, of the American Woolen Company, was the guest of honor.

The afternoon session was presided over by Mr. Weitnecht. Principal speakers at this time included Albert Shuey, chairman of the safety committee of the Lone Star Portland Cement Company, Indiana, and F. W. Rodenheber, manager of the Louisville safety council. A first aid demonstration followed.

Abrams Tells Engineers About Cement

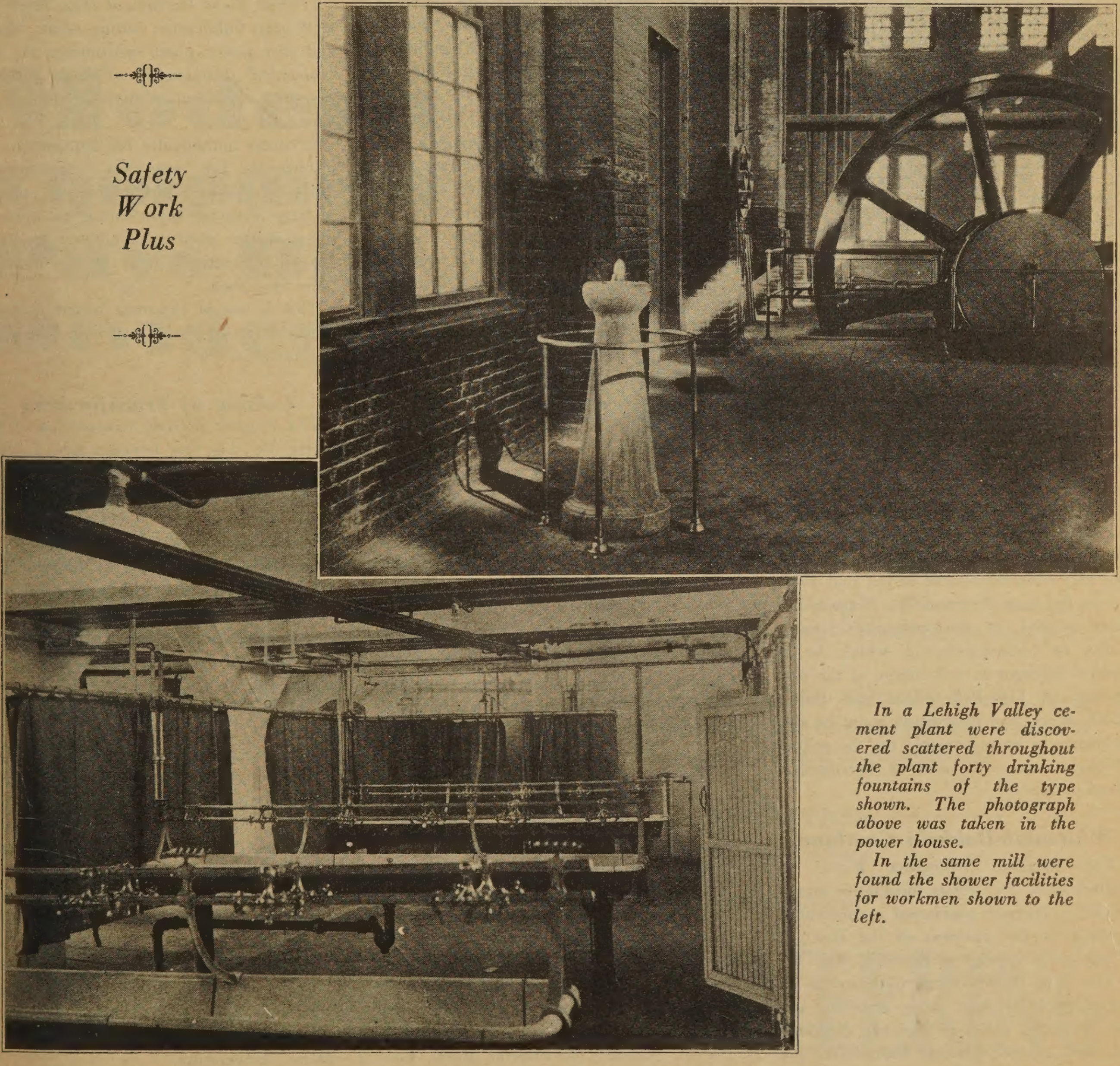
Duff A. Abrams, now director of research for the International Cement Corporation, addressed the Indianapolis section of the Indiana Engineering Society at a dinner meeting on March 19th. His subject was "Cement."

Avnsoe Elected to Vice-Presidency of International

The board of directors of the International Cement Corporation in meeting February 27th elected Th. Avnsoe to the office of vice-president in charge of operation and construction.

Mr. Avnsoe has been acting as assistant to the president, and the action of the board was prompted by a desire to relieve E. Posselt, vice-president in charge of engineering, operation and construction, of some of his many duties. Mr. Posselt will devote his efforts to handling the company's development, engineering and purchasing.

Safety Work Plus



In a Lehigh Valley cement plant were discovered scattered throughout the plant forty drinking fountains of the type shown. The photograph above was taken in the power house.

In the same mill were found the shower facilities for workmen shown to the left.

With the Manufacturers

Notes from the Field

Shilbauer Made Advertising Manager

R. A. Shilbauer, for the past several years assistant advertising manager of the *Chain Belt Company,* Milwaukee, Wis., has been appointed advertising manager.

He joined the Chain Belt Company as a rate-setter in 1920 and worked in that capacity in the various departments of the company's grey iron foundry and chain assembly plants on Park Street. Later he was transferred to the West Milwaukee Works where the company manufactures its general engineering and conveying equipment and concrete mixers and pavers. In 1925 he was placed in the advertising department where he later became assistant advertising manager.

The Chain Belt Company is a part of an affiliated group of companies consisting of the Sivyer Steel Casting Company, Federal Malleable Company, and Interstate Drop Forge Company, all of Milwaukee.

Link-Belt Elects Watson

James S. Watson has been elected vice-president of the Link-Belt Company, with headquarters at the company's Dodge works in Indianapolis, Ind.

Mr. Watson has been with the company continuously for 34 years. In January, 1903, after 8 years' experience in various departments, he was selected to take charge of the exploitation of Link-Belt Silent Chain as a power transmitting medium. Silent Chain then was new as it had only been introduced in the year 1900.

For the past 9 years Mr. Watson has been located at the company's Dodge works in Indianapolis, of which he is general manager in full charge of the production of Link-Belt Silent and Roller Chain drives, and from which point he also continues to be responsible for the selling of these drives, as well as herringbone speed reducers.

Whitcomb-Baldwin Combine

The *Baldwin Locomotive Works* of Philadelphia, Pa., steam locomotive manufacturers, recently purchased a substantial interest in the business of the *Geo. D. Whitcomb Company* at Rochelle, Ill.

The Geo. D. Whitcomb Company is an organization of fifty years standing and has developed a line of gasoline, distillate, oil, and alcohol burning locomotives for railway switching and industrial and contracting activities.

Among the large units it now manufactures are straight gear driven machines powered by gasoline, distillate and oil engines, in sizes up to 50 tons, developing draw bar pulls in low gear, up to 25,000 lbs.

The Whitcomb company is also said to have developed gas and oil electric locomotives up to the 100-ton size.

The Baldwin Locomotive Works has made an arrangement with the Geo. D. Whitcomb Company to sell the Whitcomb locomotives and products in practically all foreign countries through its own representatives, located in all parts of the world. An agreement has also been effected whereby the Baldwin Locomotive Works, through its domestic offices, will handle the railway field in the United States for the Geo. D. Whitcomb Company.

Cutler-Hammer Changes

On March 1st *P. S. Jones* became manager of the New York district office of *Cutler-Hammer, Inc.,* manufacturers of electric motor control and allied apparatus. Mr. Jones was formerly manager of the Pittsburgh office of Cutler-Hammer. He succeeds C. W. Yerger, who leaves the company to accept a position with the Hanson-Van Winkle-Munning Co., Matawan, N. J.

T. S. Towle, formerly a sales engineer of the Pittsburgh office, becomes manager at Pittsburgh.

G. E. Hunt has been placed in charge of distributors' sales for Cutler-Hammer. Mr. Hunt is widely known in eastern distributing circles having been located in the Cutler-Hammer Philadelphia offices for the past ten years.

Hardinge Office Moves

The New York office of the *Hardinge Company* on March 23rd moved from 120 Broadway to the Chanin Building, 122 East 42nd Street.

Two Copes Representatives

Messrs. Peacock Brothers, Ltd., Montreal, have been appointed *Copes* representatives for the Toronto territory by the *Northern Equipment Company,* Erie, Pa. This is an extension of the territory in which they have represented Copes regulators, governors and allied equipment for the past seven years.

A branch office is maintained by Peacock Brothers, Ltd., at 610 Federal Building, Toronto 2.

R. L. Sittinger, 80 Federal Street, Boston, Mass., has been appointed Copes representative for New England.

Harry H. Leathers, former Copes representative, is relinquishing the Copes account to Mr. Sittinger in order to devote his entire time to his other business interests.

Mr. Sittinger, heretofore associated with Mr. Leathers, is said to be one of the foremost authorities on feed water regulation in New England.

INDUSTRIAL LITERATURE

Instrument Data Book

"Power Plant Instrument Data Book" is a 48-page publication telling what, where and why power plant instruments for the economical management of steam production and consumption may be used in a particular plant.

It covers individually 105 applications of instruments for measuring temperatures, pressures, flows, liquid levels, and speeds. A large diagram representing an average steam power plant is annotated to show the approximate location of the applications described.

This is one of the most recent publications of the *Brown Instrument Company,* Philadelphia, Pa.

Catalog of Transformers

The Wagner Electric Corporation of St. Louis, Mo., has just issued a new 52-page catalog describing Wagner distribution transformers in single-phase and three-phase, pole-type and subway-type in ratings up to and including 500 Kv-a.

One-half of the catalog is devoted to a detailed description of the design and construction of Wagner distribution transformers and the remainder of the catalog is devoted to ratings, shipping weights, prices, etc.

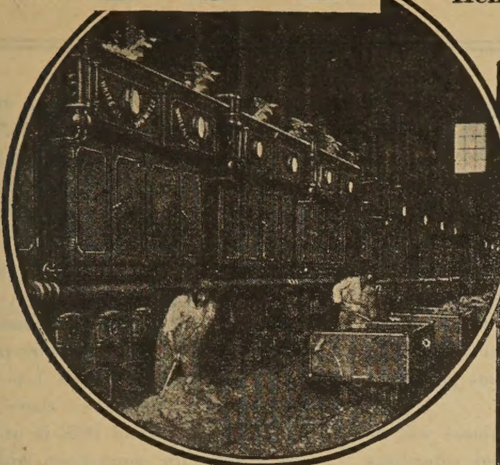
The publication is known as Bulletin 160.

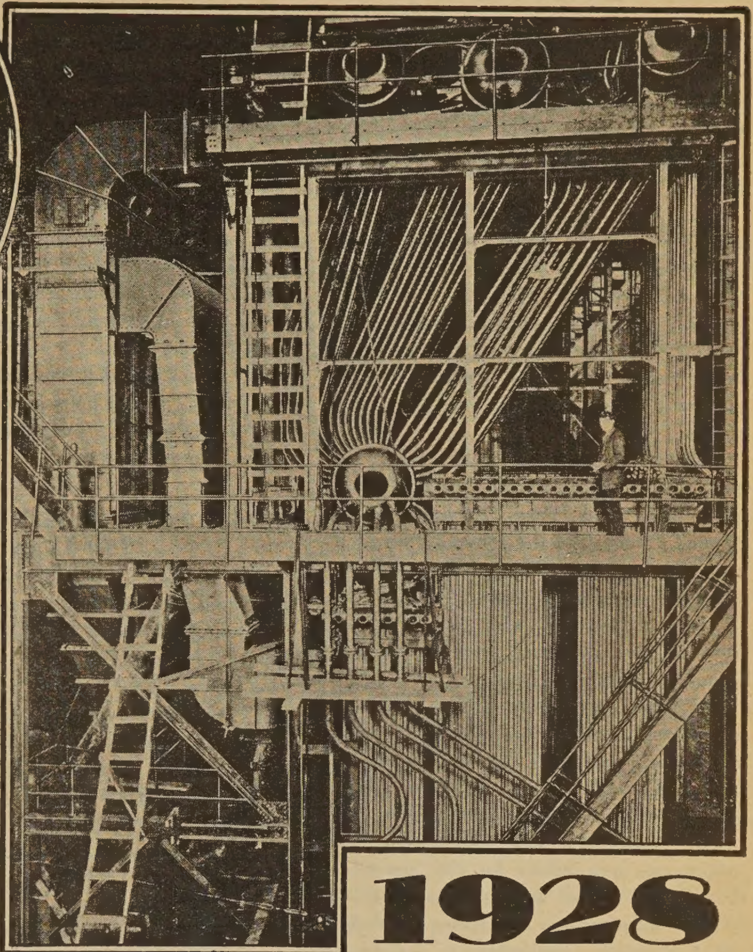
The Wagner Electric Corporation has issued in addition another bulletin, *No.* 161, containing instructions for the installation and operation of power and distribution transformers. The bulletin consists of 20-pages, and goes into detail regarding not only the installation and operation of transformers, but also their construction.

The bulletin covers such subjects as location of transformers, their storage, handling and installation; drying core and coils; drying and testing oil; proper operating temperature.

1896

Two 269 h. p.
Heine Boilers





1928

Two 863 h. p.
VX Heine Boilers

Modern Equipment Pays Big— Dividends

In 1896 the Proximity Manufacturing Company, Greensboro, N. C., first installed Heine Boilers. Nine repeat orders have been received.

In 1928 two steam generating units comprising two 863 h. p. Heine VX Boilers equipped with C-E Fin Furnaces, C-E Air Preheaters and fired by Lopulco Pulverized Fuel Systems were installed.

90,000 lb. of steam per hour is secured from each of these units, or more than the combined output of 16 of the former units.

This is a striking example of the advantages to be secured through modern steam production methods.

This company offers One Contract—One Responsibility—for complete fuel burning and steam generating installations.

COMBUSTION ENGINEERING CORPORATION
International Combustion Building 200 Madison Ave., New York
A Subsidiary of
INTERNATIONAL COMBUSTION ENGINEERING CORPORATION

COMBUSTION ENGINEERING

With the Manufacturers

St. Regis Paper Acquires Bates Valve Bag

The acquisition of the business of Bates Valve Bag Corporation by St. Regis Paper Company was consummated on February 28th.

Bates Valve Bag Corporation originated and developed the Bates system of packing cement, lime, plaster, gypsum and other rock products. The process included not only patented automatic machines for packing, but also a new type of patented "valve bag" for use in connection with the packing of materials on Bates machines.

Since 1910, substantially the entire cement production of the United States has been packed by Bates machines, it is claimed. Since 1924 the company has been one of the principal manufacturers of multi-wall sewed-end paper "valve bags." It also manufactures wire ties for cloth bags, re-tying machines and closing machines for open-end bags.

The Bates Corporation leases the use of its packing machines to cement and other manufacturers and also licenses the manufacture and sale of its patented "valve bag" by certain paper manufacturers.

The Bates Valve Bag Corporation and subsidiaries own plants for the manufacture of paper bags at Los Angeles, California, Birmingham, Alabama, Toledo, Ohio, Nazareth, Pennsylvania, Oakmont, Covington, Virginia, Menominee, Michigan, Dryden, Ontario and Three Rivers, Quebec.

F. L. Carlisle & Co., who negotiated the purchase, are the bankers for the St. Regis Paper Company and are also the bankers for the Taggart Corporation, which is said to be the second largest producer of multi-wall bags in the United States. Its paper and bag manufacturing plants are located at Watertown, Herrings, Carthage and Oswego, New York. It is estimated that the combined production of the Bates and Taggart Corporations for 1929 will exceed 250,000,000 multi-wall paper bags.

This acquisition by St. Regis Paper Company is expected to prove beneficial to both companies, for the St. Regis Paper Company, organized in 1899 is one of the largest producers of paper in the United States and Bates Valve Bag Corporation has always purchased all paper required for the manufacture of its bags from outside sources.

The manufacture of these various types of paper "valve bags" allied as they are to the distribution of food products and building materials, represent an essential industry.

A bright future is predicted for the multi-wall bag, not only in connection with the products now being packed, but in many additional lines. An indication of the possibilities for the growth of this business can be gained from the fact that in 1928 only about 30 per cent of the total production of cement alone was packed in paper "valve bags."

It is expected that the business will be carried on as a wholly owned subsidiary of St. Regis Paper Company, called Bates Valve Bag Corporation.

1928 Westinghouse Electric's Best Year

The business of the Westinghouse Electric and Manufacturing Company during the year 1928 was the best for any twelve months in its history, according to the company's annual report. Sales billed for the year were $189,050,302, and net income was $20,814,940, which figures exceed previous records by $3,500,000 and $2,700,000, respectively. The net income per share of stock, preferred and common, was $8.78, or 17.5 per cent on the par value, which compares with $6.59, or 13.2 per cent for the period covered by the last annual report. Both classes of stock are now receiving annual dividends of $4.00 per share of $50.00 par value.

Owing to a change in the fiscal year, which now ends December 31, instead of March 31 as heretofore, the present report covers officially only the nine-months period extending from April 1 to December 31, 1928, but the figures above given are for the entire year of 1928 in order to provide a basis for comparison with previous full fiscal years.

The company's total current assets are given as $135,679,223 (a gain of over $13,000,000 in nine months), and its total current liabilities are only $17,000,000. The surplus is now $67,000,000, a gain of $10,000,000 in nine months.

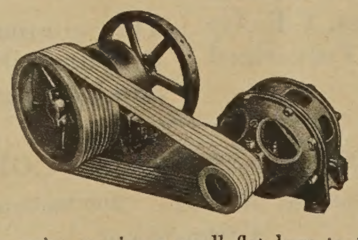
The value of unfilled orders on December 31, 1928, was approximately $47,000,000. During the nine-months period the value of orders received exceeded by almost $20,000,000 that of the same period in 1927, due largely to the increase in demand for radio products and industrial motor apparatus.

MILL EQUIPMENT

Performance of Webster Cog Belt Drives

The Webster cog belt drive, for the transmission of power, also acts as a speed reducer. This drive consists of a grooved driving pulley in the grooves of which is run a belt of trapezodial cross section.

Each pulley groove is shaped like the letter "V," either coming to a sharp point at the bottom or being cut off just above this point to give a small flat base to the groove.



The power transmitted is accomplished by the wedging action of the belt section between and against the sides of the pulley groove. The belt is designed to ride between the sides of the groove, but never to touch the bottom or base of the groove.

The three prime sections—compression, tension and neutral—are said to be correctly placed in the belts through a patented built-up unified construction; each belt is individually die-cut from the whole and templated, forming a raw-edged, non-glazing contact service. The entire belt is made with one vulcanization, regardless of length, no sectional vulcanization being used.

The Webster cog belt drives are claimed by the manufacturer to embrace the following features: smaller pulleys and extremely short center to center distances possible without the use of idlers; exact speed ratio maintained through greater gripping power; no slip; unaffected by dust or moisture laden atmosphere; absorb the shocks of power suddenly applied through the "seating" action of belts in grooves; no vibration transmitted between driving and driven machines.

Due to long life, belt replacement is said to be infrequent. Pre-stitched construction and correct mechanical design eliminate necessity of frequent "take-ups."

The drives are manufactured by the Webster Mfg. Co., Chicago.